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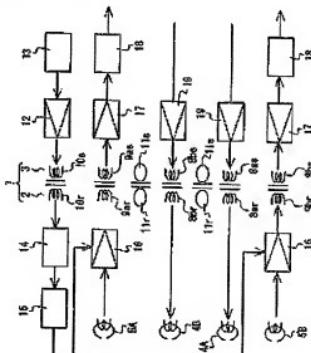
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## (54) 【発明の名義】 回転ドラム及びこれを用いた磁気テープ記録／再生装置

## (57) 【要約】

【課題】 磁気テープにヘリカル状に記録された記録トラックのトラックピッチが異なる複数種の磁気テープを再生する。

【解決手段】 アジマス角を異にし中心角で18°0' 間隔で配置された二つの再生ヘッドA、Bと、少なくとも再生信号を伝送する再生系チャンネル9a、9bと、上記再生ヘッドに電力を供給するパワー系チャンネル10とを備えたロータリートラヌス7とを有し、該ロータリートラヌスのパワー系チャンネルは回転角ではば18°0' の範囲で動作するようになっており、該パワー系チャンネルと動作時期を同じにする再生系チャンネル又は動作時期がオーバーラップする部分が大きい方の再生系チャンネルと、パワー系チャンネルとの間に、該パワー系チャンネルと動作時期を異にする又は動作時期がオーバーラップする部分が小さい方のチャンネルを配慮する。



## 【特許請求の範囲】

【請求項1】 アジマス角を翼にし中心角で180°の範間に配置された一对の再生ヘッドと、

少なくとも再生信号を伝送する再生系チャンネルと、上記再生ヘッドに電力を供給するパワー系チャンネルとを備えたロータリートラスとを有し、

該ロータリートラスのパワー系チャンネルは回転角で180°の範囲で動作するようになっており、該パワー系チャンネルと動作時期を同じにする再生系チャンネル又は動作時期がオーバーラップする部分が大きい方の再生系チャンネルと、パワー系チャンネルとの間に、該パワー系チャンネルと動作時期を異にする又は動作時期がオーバーラップする部分が小さい方のチャンネルを配置したことを特徴とする回転ドラム。

【請求項2】 請求項1に記載した回転ドラムであって、

動作時期を同じにするチャンネルと動作時期を異にするチャンネルとを交互に配置したことを特徴とする回転ドラム。

【請求項3】 請求項1に記載した回転ドラムであって、

パワー系チャンネルの動作時期とオーバーラップする部分が大きい方のチャンネルと、オーバーラップする部分が小さい方のチャンネルとを交互に配置したことを特徴とする回転ドラム。

【請求項4】 請求項1に記載した回転ドラムであって、

パワー系チャンネルと動作時期を異にするチャンネル又は動作時期がオーバーラップする部分が小さい方のチャンネルをその非動作時期において短絡させて回路路にしたこととを特徴とする回転ドラム。

【請求項5】 請求項1に記載した回転ドラムであって、

パワー系チャンネルと、これと同時期又は動作時間がオーバーラップする部分が大きい方のチャンネルとの間にシールドチャンネルを設けたことを特徴とする回転ドラム。

【請求項6】 請求項2に記載した回転ドラムであって、

パワー系チャンネルと、これと同時期又は動作時間がオーバーラップする部分が大きい方のチャンネルとの間にシールドチャンネルを設けたことを特徴とする回転ドラム。

【請求項7】 請求項3に記載した回転ドラムであって、

パワー系チャンネルと、これと同時期又は動作時間がオーバーラップする部分が大きい方のチャンネルとの間にシールドチャンネルを設けたことを特徴とする回転ドラム。

【請求項8】 請求項4に記載した回転ドラムであって、

て、

パワー系チャンネルと、これと同時期又は動作時間がオーバーラップする部分が大きい方のチャンネルとの間にシールドチャンネルを設けたことを特徴とする回転ドラム。

【請求項9】 請求項1に記載した回転ドラムであって、

アジマス角を翼にし中心角で180°の範間に配置された一对の記録ヘッドと、該記録ヘッドに記録信号を伝送する記録系チャンネルとを有し、

記録系チャンネルと、これと同時期又は動作時間がオーバーラップする部分が大きい方の再生系チャンネルとの間にシールドチャンネルを設けたことを特徴とする回転ドラム。

【請求項10】 アジマス角を翼にし中心角で180°の範間に配置された一对の再生ヘッドと、少なくとも再生信号を伝送する再生系チャンネルと、上記再生ヘッドに電力を供給するパワー系チャンネルとを備えたロータ

リートラスとを有し、該ロータリートラスのパワー系チャンネルは回転角で180°の範囲で動作するようになっており、該パワー系チャンネルと動作時期を同じにする再生系チャンネル又は動作時期がオーバーラップする部分が大きい方の再生系チャンネルと、パワー系チャンネルとの間に、該パワー系チャンネルと動作時期を異にする又は動作時期がオーバーラップする部分が小さい方のチャンネルを配置したことを特徴とする回転ドラム。

【請求項11】 請求項1に記載した回転ドラムであって、

テープ状記録媒体のテープ速度について2倍以上のモードを備えたことを特徴とする磁気テープ記録／再生装置。

【発明の詳細な説明】

【り001】

【発明の属する技術分野】本発明は、回転ドラム及びこれを用いた磁気テープ記録／再生装置に関する、具体的には、磁気テープにヘリカル状に記録された記録トラックのトラックピッチが異なる複数種の磁気テープを再生する技術に関する。

【り002】

【従来の技術】磁気テープに記録された記録トラックは、通常、アジマス角が異なる2つのトラックが横並しして所定のトラックピッチで形成され、また、1つの記録トラックは、回転ドラムのほぼ180°の範囲で形成される。

【り003】 図11乃至図14は、従来の回転ドラム&の一例を示し、図11は各ヘッドの位置関係を説明するための概略平面図である。

【り004】 かかる記録トラックの再生は、回転ドラム&にその周方向の同位にかつその回転軸方向（回転ドラム&の高さ方向）に1トラックピッチT p相当分、離して配置された2つの再生ヘッドb A, b Bにより行

なわれる。再生ヘッドb Aはアジマス角Aで、再生ヘッドb Bはアジマス角Bである。

【0005】尚、このような2つの再生ヘッドb A、b Bで読み取った再生信号は、ロータリートラnsの再生系チャンネルによりローター側からステーク側へ伝送されるようになっている。また、再生ヘッドb A、b Bには、電力を供給する必要があり、ロータリートラnsにはパワー系チャンネルが設けられ、該パワー系チャンネルにより電力がステーク側からローター側へ供給されるようになっている。

【0006】そして、再生系チャンネルは再生ヘッドb A、b Bが回転ドラムaの周方向に位相的に配置され、また、再生ヘッドb A、b Bの逆気テープcとの接触は回転ドラムaの周方向にはば180°であるため、回転ドラムaの回転(360°)のうち最初の半回転(180°分)で記録再生系チャンネルが動作し、次の半回転(180°分)では動作しないようになっている(図14参照)。

【0007】また、通常、パワー系チャンネルの動作は、再生系チャンネルが動作していないときに行われ、その電力はコンデンサーなどに蓄電され、再生ヘッドb A、b Bによる信号の読み取り用に利用されるようになっている。これは、パワー系チャンネルと再生系チャンネルとが同時に動作するとロータリートラnsの再生系チャンネルとパワー系チャンネルとの間にクロストークが生じてしまうことを防止するためである(図14参照)。

【0008】ところが、このような回転ドラムaにあっては、2つの再生ヘッドb A、b Bが回転ドラムaの高さ方向のズレ量が例えば11μmとすると(図12参照)、トラックピッチT p = 11 μmとなるため(図13参照)、トラックピッチT pが1種類の逆気テープcしか再生することができず、トラックピッチT pの異なる数種の逆気テープcの再生をすることができない。

【0009】そこで、再生ヘッドを回転ドラムの周方向に180°離隔して配置したものが考案される。

【0010】図15は、このように両方向に180°離隔して配置された2つの再生ヘッドを備える回転ドラムdを示す概略平面図である。

【0011】回転ドラムdには、2つの再生ヘッドe A、e Bが中心角で180°離隔して配置されている。再生ヘッドe Aはアジマス角Aで、再生ヘッドe Bはアジマス角Bである。

【0012】回転ドラムdの外周面には中心角でばば180°の範囲(厳密には180°以上)に逆気テープcがやや斜めに巻き付けてあり、回転ドラムdを回転させると共に逆気テープcを走行させることにより、逆気テープc上にヘリカル状に記録された記録トラックT<sub>1</sub>、T<sub>2</sub>、…を2つの再生ヘッドe A、e Bで各別に走査することになる。

【0013】そして、このように配置された2つの再生ヘッドe A、e Bによれば、テープ速度を変えることにより、トラックピッチT pが異なる記録トラックTの再生が可能となる。

【0014】即ち、記録トラックT aと記録トラックT bとの間隔(トラックピッチT p)は、テープ速度により決定され、トラックピッチT pは、テープ速度を速くするほど大きく、遅くすると小さくなることになり、これにより、逆気テープcの記録密度をテープ速度を変更することにより可変することが可能となるためである。

【0015】そこで、例えば、トラックピッチT p = 11 μmで記録された磁気テープを再生する場合には、テープ速度を第1のモードで設定して各再生ヘッドe A、e Bで記録トラックT 1a、T 1b、T 2a、T 2b、…を各自に順次走査して記録信号を読み取ることがができる(図16参照)。

【0016】また、トラックピッチT p = 5.5 μmで記録された逆気テープc'を再生する場合には、上記第1のモードにおけるテープ速度よりもはば1/2倍にした第2のモードにすることにより、各再生ヘッドe A、e Bで記録トラックT 2a、T 2b、T 2a、T 2b、…を各自に順次走査して記録信号を読み取ることがができる(図17参照)。

#### 【0017】

【免弱解消しようとする詳説】ところで、このように配置した再生ヘッドe A、e Bはそのいわゆる常に逆気テープc、c'に接触しており、これら再生ヘッドe A、e Bで読み取った再生信号を、常時、ローター側からステーク側へ伝送する必要があり、ロータリートラnsの2つの再生系チャンネルg A、g Bは、そのいずれかが、常時動作するようになっている(図18参照)。

【0018】また、ロータリートラnsには再生ヘッドe A、e Bに電力を供給するためのパワー系チャンネルhは、少なくとも、これが動作している間に、いずれかの再生系チャンネルg A又はg Bが動作してしまっていふことになり、再生系チャンネルg A又はg Bとパワー系チャンネルhとのクロストークが生じてしまふという問題がある。

【0019】そこで、本発明回転ドラムは、上記した課題を解決するために、アジマス角を異にし中心角で180°離隔して配置された2つの再生ヘッドと、少なくとも再生信号を伝送する再生系チャンネルと、上記再生ヘッドに電力を供給するパワー系チャンネルとを備えたロータリートラnsとを有し、該ロータリートラnsのパワー系チャンネルは回転角でばば180°の範囲で動作するようになっており、該パワー系チャンネル又は動作時期がオーバーラップする部分が大きい方の再生系チャンネルと、パワー系チャンネルとの間に、該パワー系チャンネルと動

動作時期を異にする又は動作時間がオーバーラップする部分が小さい方のチャンネルを配置したものである。

【0020】従って、本発明回転ドラムにあっては、動作時期を同じ又はオーバーラップする部分が大きい方のパワー系チャンネルと再生系チャンネルとをできるだけ離間させ、かつ、両チャンネルとの間に、動作時間差を誤にする又はオーバーラップする部分が小さい方のチャンネルを介在させたので、パワー系チャンネルが動作していても、同時に又はオーバーラップする部分が大きい動作時期の再生系チャンネルとのクロストークが生ぜず、また、テープ速度を変えることにより、トラックピッチの異なる記録トラックを再生することができ、異なるトラックピッチで記録された複数個の磁気テープの再生を可能にして、延ばしては、高記録密度の磁気テープの再生を可能にすることができる。

【0021】また、本発明磁気テープ記録／再生装置は、上記した課題を解決するために、アジマス角を異にし中心角で180°離間して配置され一方の再生ヘッドと、少なくとも再生信号を伝送する再生系チャンネルと、上記再生ヘッドに電力を供給するパワー系チャンネルとを備えたロータリートラランスとを有し、該ロータリートラランスのパワー系チャンネルは回転角では180°の範囲で動作するようになっており、該パワー系チャンネルの動作時期を同じにする再生系チャンネル又は動作時期がオーバーラップする部分が大きい方の再生系チャンネルと、パワー系チャンネルとの間に、該パワー系チャンネルと動作時期を異にする又は動作時期がオーバーラップする部分が小さい方のチャンネルを配置した回転ドラムを開け、テープ状記録媒体のテープ速度について2種以上のモードを備えたものである。

【0022】従って、本発明磁気テープ記録／再生装置にあっては、一対の再生ヘッドを中心角で180°離間して配置したので、従来のように再生ヘッドの位置間隔によりトラックピッチが制限されることなく、また、テープ速度について2種以上のモードを備えたので、テープ速度を誤らせるることにより、トラックピッチを実現することができ、これにより、記録密度の高密度化を図ることができる。

【0023】

【発明の実施の形態】以下に、本発明回転ドラム及びこれを用いる磁気テープ記録／再生装置の詳細を逐項図面に示した各実施の形態に従って説明する。

【0024】尚、各実施の形態で説明する回転ドラム及び磁気テープ記録／再生装置は、コンピューター用のデータ記録装置として知られる磁気テープストリーマー・ドライブ装置に適用したものとし、かかる磁気テープストリーマー・ドライブ装置は、情報をテープ状記録媒体に記録しながらその情報を再生して、情報の記録が正しく行われたか否かをチェックすることができる機能、いわゆるRAW(Read after Write)機能を備

えるものであり、RAW機能を実現するために、記録ヘッドと再生ヘッドとを有し、記録ヘッドへの信号の伝送及び再生ヘッドからの信号の伝送を行なうため、ロータリートラランスには記録系チャンネルと再生系チャンネルとを有する。

【0025】図1乃至図4は、このようなRAW機能を実現するための回転ドラムの第1の実施の形態を示し、図1は各ヘッドの位置関係を説明するための概略平面図である。

【0026】回転ドラム1は、ローター側ドラム2とステアラー側ドラム3とから成り(図1參照)、ローター側ドラム2には、2つの記録ヘッド4A、4Bと2つの再生ヘッド5A、5Bを有し、2つの記録ヘッド4Aと4Bとは互いに中心角で180°離間して、また、2つの再生ヘッド5Aと5Bとも互いに中心角で180°離間して配置されている(図1參照)。記録ヘッド4Aはアジマス角Aで、記録ヘッド4Bはアジマス角Bであり、また、再生ヘッド5Aはアジマス角Aで、再生ヘッド5Bはアジマス角Bである。

【0027】記録ヘッド4Aと再生ヘッド5Aは、回転ドラム1の回転軸方向(回転ドラム1の高さ方向)に所定の間隔を空けて配置され、また、記録ヘッド4Bと再生ヘッド5Bも記録ヘッド4A、再生ヘッド5Aと同様に所定の間隔を空けて配置されている。尚、図1において、記録ヘッド4Aと再生ヘッド5A又は記録ヘッド4Bと再生ヘッド5Bとを周方向に並べて示したが、これは平面図に各ヘッドを表記するためである。また、この実施の形態においては記録ヘッド及び再生ヘッドをそれぞれ2つづつ設けたが、本発明はヘッドの数には限定されない。

【0028】尚、図示は省略したが、各2つのヘッド4Aと4B又は5Aと5Bとは磁気テープ6に接触しているものがスイッティングにより選択されて、後述するロータリートラランスの対応する各チャンネルにおいて信号の伝送がされるようになっている。

【0029】磁気テープ6は回転ドラム1に対して180°以上の角度で斜めに巻き付けられており、これにより、記録トラックT<sub>1</sub>、T<sub>2</sub>、…は所定の角度をもって斜めに形成され、また、アジマス角Aの記録トラックT<sub>1</sub>とアジマス角Bの記録トラックT<sub>2</sub>と離接して形成されることになる。

【0030】また、磁気テープ6上の1つの記録トラックT<sub>1</sub>を形成するための記録ヘッド4A及び4Bの回転角は180°以内になっており、これにより、磁気テープ6よりもやや小さな幅の領域に記録トラックT<sub>1</sub>が形成される。

【0031】そして、2つの記録ヘッド4A、4Bが中心角で180°離間して配置されており、記録トラックT<sub>1</sub>と記録トラックT<sub>2</sub>との間隔(トラックピッチT<sub>1</sub>p)は、上述のようにテープ速度に依存されるため、ト

ラックピッチTpを小さくして記録密度を高密度化するにはテープ速度を速くする。また、2つの再生ヘッド5A、5Bも中心角で180°離して配置されているため、そのテープ速度で記録トラックを読み取ることができ、RAW機能を実現することができる。

【0032】回転ドラム1のローター側とステーク側との信号の伝送は、ロータリートランジス7によりされ、ロータリートランジス7は、各ヘッド4A、4B、5A、5Bに対応する各別チャンネル8a、8b、9a、9bと、再生ヘッド5A、5B用のアンプ(後述する)に電力を伝送するためのパワー系チャンネル10と、該パワー系チャンネル10からのクロストークを防止するためのシールドチャンネルとしてのショートリング11、11とを有する。

【0033】各チャンネル8、9、10、11は、それぞれローター側要素rとステーク側要素sとかぶら成り、これら各要素r、sは、リング状に巻き戻されたコイルが巻状構内に収納されて互いに向向して配置されている。

【0034】そして、各チャンネルの配列は、ロータリートランジス7の回転中心側から、パワー系チャンネル10、再生系チャンネル9a、ショートリング11、記録系チャンネル8b、再生系チャンネル8bの順となっている。

【0035】ロータリートランジス7のパワー系チャンネル10のステーク側要素10sはパワー駆動アンプ12、免振回路13に接続されており、パワー信号をローター側要素10rに伝送するようになっている。

【0036】パワー系チャンネル10のローター側要素10rに伝送されたパワー信号は、盤面・平滑回路14、レギュレーター15を介して、再生ヘッド5A、5B用のアンプ16、16に供給される。尚、図示は省略したが、盤面・平滑回路14とレギュレーター15との間にコンデンサー等が設けられており、パワー信号が回転ドラム1の半回転分(180°)供給され、後の半回転分(180°)は上記コンデンサー等で蓄積されたパワーが再生ヘッドの後述のアンプ16に供給されるようになっている。

【0037】再生ヘッド5A、5Bにより再生された再生信号は、アンプ16、16により増幅されて再生系チャンネル9a、9bのローター側要素9ar、9brに供給された後、再生系チャンネル9a、9bのステーク側要素9as、9bsにそれぞれ迂回され、再生アンプ17、17、イコライザー18、18を介して出力される。

【0038】記録信号は、ステーク側に配設された記録アンプ19、19により増幅されて、記録系チャンネル8a、8bのステーク側要素8as、8bsに供給された後、記録系チャンネル8a、8bのローター側要素8ar、8brにそれぞれ伝送され、記録ヘッド4

A、4Bに各別に供給されて、透気テープ6に記録される。

【0039】しかして、各チャンネル8a、8b、9a、9b、10(ショートリング11、11は除く。)の動作は、以下の通りである。

【0040】図4は、ロータリートランジス7の各チャンネル8a、8b、9a、9b、10(ショートリング11、11は除く。)の動作(伝送している状態)を示すタイミングチャートである。

【0041】図4から解るように、2つの記録ヘッド4A、4Bは回転ドラム1の周方向において中心角で180°離して配置されているため、記録系チャンネル8a又は8bは、記録ヘッド4A又は4Bが透気テープ6に接触している間、即ち、回転ドラム1の半周分動作し、次の半周分は記録ヘッド4B又は4Aが透気テープ6に接触するため、他方の記録系チャンネル8b又は8aが動作することになる。

【0042】これにより、2つの記録系チャンネル8a、8bは互いに一方が動作しているときは他方は動作していない状態、即ち、時間的にオーバーラップすることがないので、両者のクロストークは生じない。

【0043】同様に、2つの再生ヘッド5A、5Bは回転ドラム1の周方向において中心角で180°離して配置されているため、再生系チャンネル9a又は9bは、再生ヘッド5A又は5Bが透気テープ6に接触している間、即ち、回転ドラム1の半周分動作し、次の半周分は再生ヘッド5B又は5Aが透気テープ6に接触するため、他方の再生系チャンネル8b又は8aが動作することになる。

【0044】これにより、2つの再生系チャンネル8a、8bは互いに一方が動作しているときは他方は動作していない状態、即ち、時間的にオーバーラップすることがないので、両者のクロストークは生じない。

【0045】そして、パワー系チャンネル10は、記録系チャンネル8b及び再生系チャンネル9bが動作しているときに動作するようになっているが、パワー系チャンネル10の動作時に遮断的漏れ、遮断的漏れの最も影響を受けやすい同時に動作する再生系チャンネル9bがパワー系チャンネル10からもっとも離れた位置に配置され、しかも、そのとき動作していない他のチャンネル(記録系チャンネル8a及び再生系チャンネル9a)を両者間に存在させたため、両者間でクロストークが生ずることはない。

【0046】このように、この上記回転ドラム2にあっても、記録ヘッド4A、4B及び再生ヘッド5A、5Bを互いに180°離して配置したので、上述のように、テープ速度を変更することにより容易にトラックピッチTpを変更することができ、また、各種の異なるトラックピッチTpの記録トラックを再生することができ、しかも、ロータリートランジス7の各チャンネル間に

おいてクロストークが生ずることはない。

【0047】また、この実施の形態にあっては、パワー系チャンネル10を回転ドラム1の最も内側に配置したので、回転ドラム1の外周部に配置された各ヘッド4a、4b、5a、5bとのクロストークを防止することができる。

【0048】尚、再生系チャンネル9aとこれに隣接するショートリング11とを、また、記録系チャンネル8bとこれに隣接するショートリング11とをそれぞれ入れ替えるも、クロストークの問題は生じない。

【0049】さらに、再生系チャンネル9aと記録系チャンネル8aとを入れ替えても、各チャンネル間のクロストークの問題は生じない。

【0050】図8は、ロータリートランスク7の変形例7Aを示す概略回路図であり、このロータリートランスク7Aの記録系チャンネル8b及び再生系チャンネル9aのそれぞれのステーカー側要素8b,r、9a,rにスイッチ20、20をそれれ配置して短絡させたものである。

【0051】そして、パワー系チャンネル10が動作しているときにこれらスイッチ20、20を接続して各々データー側要素8b,r、9a,rを短絡させることにより、これら再生系チャンネル9a及び記録系チャンネル8aをシールドチャンネルとして機能させることができ。さらに、パワー系チャンネル10と同時に動作する記録系チャンネル8b及び再生系チャンネル9bとのクロストークを回避することができる。

【0052】図6乃至図10は本発明の第2の実施の形態を示すものであり、かかる第2の実施の形態が、上記第1の実施の形態と比較して相異する点は、再生ヘッドと記録ヘッドとを回転ドラムの周方向に沿った位置に配置した点であるので、図面には要部のみを示し、また、その説明は上記組成についてのみ行い、他の部分については図面の要部に前記第1の実施の形態に係る回転ドラムにおける同様の部分に付した符号と同じ符号を付すことによりその説明を省略する。

【0053】回転ドラム2はローター側ドラム22とステーカー側ドラム23とから成り(図7参照)。ローター側ドラム22には、2つの記録ヘッド24A、24Bと2つの再生ヘッド25A、25Bとを有し、2つの記録ヘッド24Aと24Bとは互いに中心角で180°離して、また、2つの再生ヘッド25Aと25Bとも互いに中心角で180°離して配置されている(図6参照)。

【0054】記録ヘッド24Aと再生ヘッド25Aは、回転ドラム2の周方向にはば45°離して配置される。また、記録ヘッド24Bと再生ヘッド25Bも記録ヘッド24A、再生ヘッド25Aと同様に回転ドラム2の周方向にはば45°離して配置されている。

【0055】回転ドラム2のローター側とステーカー側との信号の伝送は、ロータリートランスク26により左

され、ロータリートランスク26は、各ヘッド24A、24B、25A、25Bに対応する各別のチャンネル27a、27b、27c、28a、28bと、再生ヘッド25A、25B用のアンプに電力を伝達するためのパワー系チャンネル10と、該パワー系チャンネル10からのクロストークを防止するためのシールドチャンネルとしてのショートリング11、11とを有する。

【0056】そして、各チャンネルの配列は、ロータリートランスク26の回転中心側から、パワー系チャンネル

10、ショートリング11、記録系チャンネル27a、ショートリング11、記録系チャンネル27b、再生系チャンネル28a、再生系チャンネル28bの順となっている。

【0057】しかして、各チャンネル27a、27b、28a、28b、10(ショートリング11、11は除く。)の動作は、以下の通りである。

【0058】図9は、ロータリートランスク26の各チャンネル27a、27b、28a、28b、10(ショートリング11、11は除く。)の動作(伝送している状態)を示すタイミングチャートである。

【0059】図9から解るように、2つの記録ヘッド24A、24Bは回転ドラム1の周方向において中心角で180°離して配置されているため、上記第1の実施の形態の場合と同様に、記録系チャンネル27aと27bとは、時間的にオーバーラップすることがないので、両者間のクロストークは生じない。

【0060】同様に、2つの再生ヘッド25A、25Bは回転ドラム1の周方向において中心角で180°離して配置されているため、再生系チャンネル28aと28bとは、時間的にオーバーラップすることがないので、両者間のクロストークは生じない。

【0061】また、パワー系チャンネル10の動作時期と、オーバーラップする部分が大きな再生系チャンネル28bは、パワー系チャンネル10からもっとも離れた位置に配置され、しかも、その行動しない又は担当する時間のオーバーラップする部分が小さな他のチャンネル(記録系チャンネル27a及び再生系チャンネル28a)を両者間に存在させたため、両者間でクロストークが生ずることはない。

【0062】尚、パワー系チャンネル10と同時に動作する記録系チャンネル27bは、時間的にクロストークの可能性があるが、両者間にこれらと動作時期を異なる記録系チャンネル27a及びショートリング11が介在されており、これらがシールドチャンネルとして機能するため、両者間のクロストークは生じない。

【0063】また、記録ヘッド24A又は24Bと再生ヘッド25A又は25Bとは互いに中心角で45°ずれて配置されているため、記録系チャンネル27a又は27bと再生系チャンネル28a又は28bとが時間的にオーバーラップして動作することになるが、記録系チャ

チャンネル27aと再生系チャンネル28aとの間にはこれらと動作時期を異にする記録系チャンネル27b及びショートリング11が介在されており、これらがシールドチャンネルとして機械するため、両者間のクロストークは生ぜず。記録系チャンネル27bと再生系チャンネル28bとの間にはこれらと動作時期を異にする再生系チャンネル28aが介在されており、これがシールドチャンネルとして機能するため、両者間のクロストークは生じないようになっている。

【0064】このように、この上記回転ドラム1にあっても、記録ヘッド24A、24B及び再生ヘッド25A、25Bを互いに180°離隔して配置した上で、上述のように、データ速度を変更することにより最初にトラックピッチTpを変更することができ、また、各種の異なるトラックピッチTpの記録トラックを再構成することができ、しかも、ロータリートラーンス26の各チャンネル間においてクロストークが生じることはない。

【0065】図10は、上記第2の実施の形態における各チャンネルの動作時期に関する変形例を示すタイミングチャート図である。

【0066】この変形例が上記第2の実施の形態と相異する点は、パワー系チャンネルと記録系チャンネルとの\*

\*動作の位相をずらして、パワー系チャンネルと再生系チャンネルとの動作の位相を合せた点である。

【0067】この変形例によれば、パワー系チャンネルの動作切換と2つの再生系チャンネルの動作切換を同時にすることになり、パワー系チャンネルの動作時期に動作する再生系チャンネルを1つにすることでき、よって、かかる再生系チャンネルとパワー系チャンネルとの間だけに動作時期を異にする他のチャンネルを配置するだけで、クロストークの防止を確実に行なうことができる。これら動作時期を同じにするパワー系チャンネルと再生系チャンネルとを最も簡便な位置に配置する必要もなくなり、設計の自由度を高めることができる。

【0068】また、上記各実施の形態において、パワー系チャンネルを回転ドラムの内周側に配置したものについて説明したが、本発明はこれに限らず、パワー系チャンネルが回転ドラムの外周側に配置されても良く。【0069】さらに、本発明は、上記実施の形態及び変形例で示したものに限らず、各チャンネルに同じ、表1示すような配置が考えられる。

#### 20 [0070]

[表1]

21 [0071]

順	イ	ロ	ハ	ニ	ホ
A	パワー系chA	パワー系chB	パワー系chB	再生系chB	再生系chB
B	再生系chAと ショートリングの 組合せ	記録系chAと ショートリングの 組合せ	記録系chAと ショートリングの 組合せ	再生系chAと ショートリングの 組合せ	再生系chAと ショートリングの 組合せ
C	組合せ				
D	再生系chB	記録系chB	再生系chB	パワー系chB	パワー系chB
E	記録系chAと ショートリングの 組合せ	再生系chAと ショートリングの 組合せ	再生系chAと ショートリングの 組合せ	再生系chAと ショートリングの 組合せ	記録系chAと ショートリングの 組合せ
F	組合せ				
G	記録系chB	再生系chB	記録系chB	記録系chB	記録系chB

【0071】尚、表1において、横欄(Ⓐ～G)はロータリートラーンスの番号であり、添字Aが内周側、添字Cが外周側を示す。また、横幅(イ～ホ)は各チャンネルの配置のパターン例を示す。

【0072】尚、パターンのB添字C添字D添字E添字F添字G添字Hには各チャンネルの配置のパターン例を示す。

【0073】ここで、パワー系チャンネルの運転の編

成、磁気的偏角の影響がもっとも大きい再生系チャンネルをパワー系チャンネルから離すことが有効であるが、パワー系チャンネルの送信バーゲンが小さい場合には、パターン(ニ)、(ホ)のように、パワー系チャンネルを径方向に並んで溝の真ん中に配置しても良いことを示す。

【0074】また、パワー系チャンネルの動作と再生系

チャンネルの動作との位相が一致せず、オーバーラップする部分が大きい場合には、両チャンネル間でクロストークする可能性があるため、パターン(イ)、(ロ)、(ハ)のように両チャンネルをできるだけ離すことが有効であり、内周側と外周側にそれぞれは位置することが好ましい。

【0075】尚、上記実施の形態においては、再生ヘッドと記録ヘッドとを備えた回転ドラムについて説明したが、本発明はこれに限らず、再生ヘッドのみを備えた回転ヘッドにも適用することができる。

【0076】また、本発明はコンピューター用のデータ記録装置として知られる磁気テープストリーマードライブ装置に限らず、磁気テープへ情報を記録しながら記録された情報のチェックを行なう機能(RAW機能)を備えたものに広く適用することができる。

【0077】さらに、前記した各実施の形態及び変形例において示した各部の具体的な形状乃至構造は、本發明

明を実施するに当たっての具体化のほんの一例を示したものに過ぎず、これらによって本発明の技術的範囲が概要的に解説されることがあってはならないものである。【0078】

【発明の効果】以上に記載したとおり、本発明回転ドラムは、アジャス角を異にし中心角で180°離して配置された一对の再生ヘッドと、少なくとも再生信号を伝送する再生系チャンネルと、上記再生ヘッドに電力を供給するパワー系チャンネルとを備えたロータリートラ

ンスとを有し、該ロータリートラヌスのパワー系チャンネルは回転角で180°の範囲で動作するようになっており、該パワー系チャンネルと動作時期を異にする再生系チャンネル又は動作時期がオーバーラップする部分が大きい方の再生系チャンネルと、パワー系チャンネルとの間に、該パワー系チャンネルと動作時期を異にする又は動作時期がオーバーラップする部分が小さい方のチャンネルを配置したことを持つとする。

【0079】従って、本発明回転ドラムにあっては、再生ヘッドを180°離して配置した上で、トラックピッヂの異なる磁気テープの読み取りを磁頭にするとともに、パワー系チャンネルと動作時期を異にする再生系チャンネル又は動作時期がオーバーラップする部分が大きい方の再生系チャンネルと、パワー系チャンネルとの間に、該パワー系チャンネルと動作時期を異にする又は動作時期がオーバーラップする部分が小さい方のチャンネルを配置したので、ロータリートラヌスにおけるクロストークが生じることを防止することができる。

【0080】請求項2記載した発明は、動作時期を同じにするチャンネルと動作時期を異にするチャンネルとを交互に配置したので、記録ヘッドを持つ回転ドラムに適用することにより、いわゆるRAW機を実現することができる。

【0081】請求項3に記載した発明は、パワー系チャンネルの動作時期とオーバーラップする部分が大きい方のチャンネルと、オーバーラップする部分が小さい方のチャンネルとを交互に配置したので、記録ヘッドを持つ回転ドラムに適用することにより、いわゆるRAW機を実現することができる。

【0082】請求項4に記載した発明は、パワー系チャンネルと動作時期を異にするチャンネル又は動作時期がオーバーラップする部分が小さい方のチャンネルをその非動作時期において短絡させて断路路線としたので、これらチャンネルをシールドチャンネルとして有効に機能させることができ、ロータリートラヌスのクロストークの防止をより確実なものにすることができる。

- 【図7】ロータリートランスの抜端断面図である。
- 【図8】機械回路図である。
- 【図9】各チャンネルの動作状態を示すタイミングチャート図である。
- 【図10】動作時期の変形例を示すタイミングチャート図である。
- 【図11】図12乃至図14とともに従来の回転ドラムの一例を示すもので、本図はローター側ドラムを機械的に示す平面図である。
- 【図12】回転ドラムの横断面図である。
- 【図13】送気テープ上に記録されたトラックを模式的に示した記録パターン図である。
- 【図14】各チャンネルの動作状態を示すタイミングチャート図である。
- 【図15】図16乃至図18とともに別の従来の回転ドラムの一例を示すもので、本図はローター側ドラムを機械的に示す平面図である。
- 【図16】モード1で送気テープ上に記録されたトラックを模式的に示した記録パターン図である。
- 【図17】モード2で送気テープ上に記録されたトラックを模式的に示した記録パターン図である。

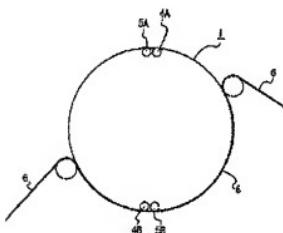
\* クを模式的に示した記録パターン図である。

【図18】各チャンネルの動作状態を示すタイミングチャート図である。

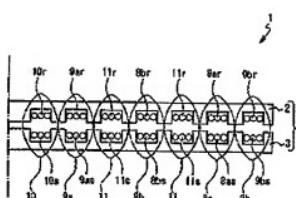
【符号の説明】

- 、1…回転ドラム、4 A…記録ヘッド（アシマス角A）、4 B…記録ヘッド（アシマス角B）、5 A…再生ヘッド（アシマス角A）、5 B…再生ヘッド（アシマス角B）、7…ロータリートランス、8 a…記録系チャンネル（アシマス角A）、8 b…記録系チャンネル（アシマス角B）、9 a…再生系チャンネル（アシマス角A）、9 b…再生系チャンネル（アシマス角B）、10…パワーチャンネル、11…ショーリング（シールドチャンネル）、21…回転ドラム、24 A…記録ヘッド（アシマス角A）、24 B…記録ヘッド（アシマス角B）、25 A…再生ヘッド（アシマス角B）、25 B…再生ヘッド（アシマス角B）、26…ロータリートランス、27 a…記録系チャンネル（アシマス角A）、27 b…記録系チャンネル（アシマス角B）、28…再生系チャンネル（アシマス角A）、28…再生系チャンネル（アシマス角B）

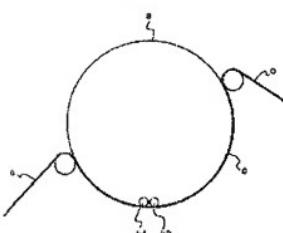
【図1】



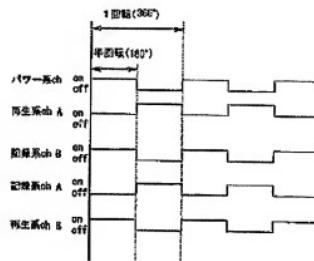
【図2】



【図11】



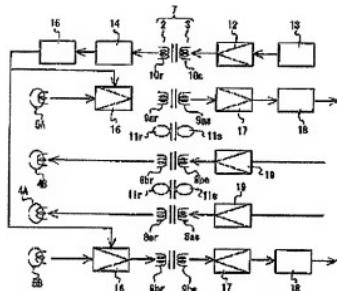
【図4】



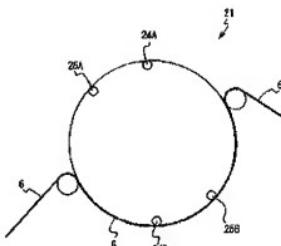
(10)

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【図3】

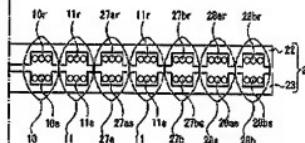
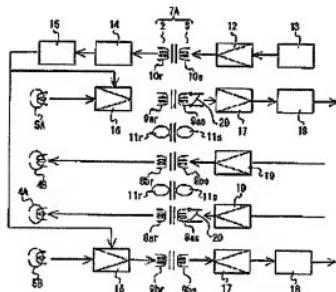


【図6】

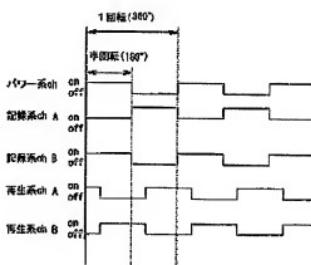


【図7】

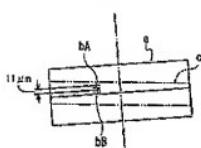
【図5】



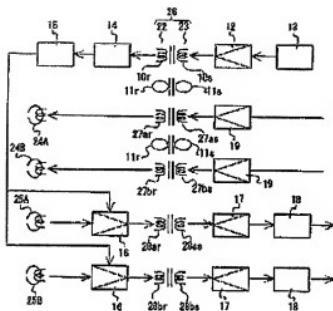
【図9】



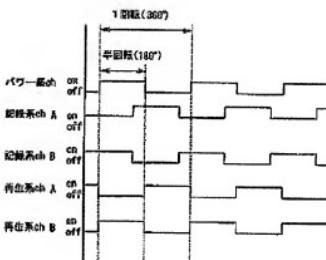
【図12】



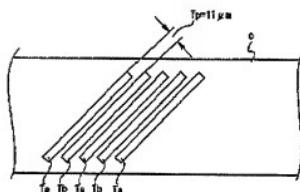
〔図8〕



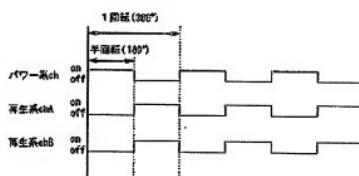
〔図10〕



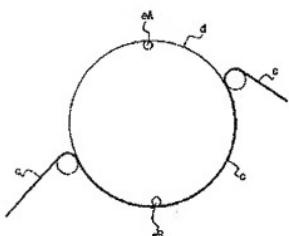
〔図13〕



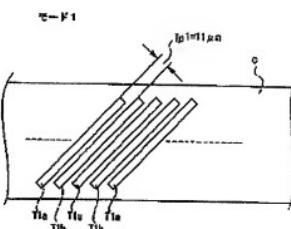
〔図14〕



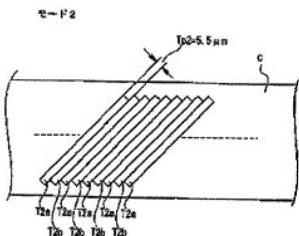
〔図15〕



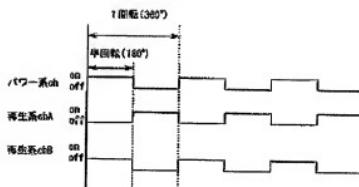
〔図16〕



【図17】



【図18】



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**Applicant: Sony Corp**

**Inventors: Shirai Toshio and Osue Tadashi**

**Title: Rotary Drum and Magnetic Tape Recording/Reproducing  
Device Using the Drum**

**Application No.: 11-343241**

**Application Date: December 12, 1999**

**International Classes: G11B 5/02**

**G11B 5/52**

## English Translation of Japanese Publication No. 2001-160201\*

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### CLAIMS

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[Claim(s)]

[Claim 1] The reproducing head of the couple which differed in the azimuth angle, estranged 180 degrees and has been arranged by the central angle, It has the rotary transformer equipped with the reversion system channel which transmits a regenerative signal at least, and the power system channel which supplies power to the above-mentioned reproducing head. The power system channel of this rotary transformer operates in 180 degrees by the angle of rotation. This power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel The rotating drum characterized by having arranged the channel with the smaller part which a stage of operation overlaps or it differs in this power system channel and a stage of operation.

[Claim 2] The rotating drum which is a rotating drum indicated to claim 1, and is characterized by having arranged by turns the channel which makes a stage of operation the same, and the channel which differs in a stage of operation.

[Claim 3] The rotating drum which is a rotating drum indicated to claim 1, and is characterized by having arranged the channel with the larger part which overlaps the stage of a power system channel of operation, and the channel with the smaller part to overlap by turns.

[Claim 4] The rotating drum which is a rotating drum indicated to claim 1, and is characterized by for the part which a power system channel, the channel which differs in a stage of operation, or a stage of operation overlaps having short-circuited the channel of the smaller one in the non-operating stage, and making it a closed circuit.

[Claim 5] The rotating drum which is a rotating drum indicated to claim 1, and is characterized by preparing a shielding channel between a power system channel and a channel with the larger part which a this and coincidence term or a stage of operation overlaps.

[Claim 6] The rotating drum which is a rotating drum indicated to claim 2, and is characterized by preparing a shielding channel between a power system channel and a channel with the larger part which a this and coincidence term or a stage of operation overlaps.

[Claim 7] The rotating drum which is a rotating drum indicated to claim 3, and is characterized by preparing a shielding channel between a power system channel and a channel with the larger part which a this and coincidence term or a stage of operation overlaps.

[Claim 8] The rotating drum which is a rotating drum indicated to claim 4, and is characterized by preparing a shielding channel between a power system channel and a channel with the larger part which a this and coincidence term or a stage of operation overlaps.

[Claim 9] The rotating drum characterized by being the rotating drum indicated to claim 1, differing in an azimuth angle, having the rotary transformer equipped with the recording system channel which transmits a record signal to the recording head and this recording head of the couple which estranged 180 degrees and has been arranged by the central angle, and preparing a shielding channel between a recording system channel and a reversion system channel with the larger part which a this and coincidence term or a stage of operation overlaps.

[Claim 10] The reproducing head of the couple which differed in the azimuth angle, estranged 180 degrees and has been arranged by the central angle, It has the rotary transformer equipped

with the reversion system channel which transmits a regenerative signal at least, and the power system channel which supplies power to the above-mentioned reproducing head. The power system channel of this rotary transformer operates in 180 degrees by the angle of rotation. This power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel. The magnetic tape record / regenerative apparatus characterized by having prepared the rotating drum which has arranged the channel with the smaller part which a stage of operation overlaps or it differed in this power system channel and the stage of operation, and having two or more sorts of modes about the tape speed of a tape-like record medium.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the magnetic tape record / regenerative apparatus which used a rotating drum and this. It is related with the technique which plays two or more sorts of magnetic tapes with which the track pitches of the recording track recorded on the magnetic tape in the shape of helical one specifically differ.

[0002]

[Description of the Prior Art] Two trucks with which azimuth angles differ usually adjoin, and the recording track recorded on the magnetic tape is formed by the predetermined track pitch, and one recording track is formed in [ of a rotating drum ] about 180 degrees.

[0003] Drawing 11 thru/drawing 14 show an example of the conventional rotating-drum a, and drawing 11 is an outline top view for explaining the physical relationship of each head.

[0004] playback of this recording track -- rotating-drum a -- the homotopic of the hoop direction -- and it is performed in the direction of a revolving shaft (the height direction of rotating-drum a) by the 1 track pitch Tp by the two reproducing heads bA and bB estranged and arranged. The reproducing head bA is azimuth-angle A, and the reproducing head bB is azimuth-angle B.

[0005] In addition, the regenerative signal read by such the two reproducing heads bA and bB is transmitted to a stator side from a rotor side by the reversion system channel of a rotary transformer. Moreover, it is necessary to supply power to the reproducing heads bA and bB, a power system channel is prepared in a rotary transformer, and power is supplied to a rotor side by this power system channel from a stator side.

[0006] And by arranging the reproducing heads bA and bB in the hoop direction of rotating-drum a at homotopic, as for a reversion system channel, since it is about 180 degrees in the hoop direction of rotating-drum a, as for the contact to magnetic tape c of the reproducing heads bA and bB, the above-mentioned reversion system channel operates by the first half-revolution (180 degrees) among 1 revolutions (360 degrees) of rotating-drum a, and it operates in the next half-revolution (180 degrees) (refer to drawing 14 ).

[0007] Moreover, actuation of a power system channel is performed while the reversion system channel is not operating, a capacitor etc. stores electricity the power and it is usually used for reading of the signal by the reproducing heads bA and bB. This is for preventing that a cross talk arises between the reversion system channel of a rotary transformer, and a power system channel, when a power system channel and a reversion system channel operate simultaneously (refer to drawing 14 ).

[0008] However, if it is in such rotating-drum a, if the amount of gaps of the height direction of

rotating-drum a sets to 11 micrometers (refer to drawing 12 ), since the two reproducing heads bA and bB will be set to track pitch  $T_p=11$ micrometer (refer to drawing 13 ), a track pitch  $T_p$  can reproduce only 1 kind of magnetic tape c, and they cannot reproduce several sorts magnetic tape c from which a track pitch  $T_p$  differs.

[0009] Then, what estranged 180 degrees of reproducing heads to the hoop direction of a rotating drum, and has arranged them to it can be considered.

[0010] Drawing 15 is the outline top view showing rotating-drum d equipped with the two reproducing heads which estranged 180 degrees to the hoop direction and have been arranged in this way in it.

[0011] By the central angle, the two reproducing heads eA and eB estrange 180 degrees in rotating-drum d, and are arranged in it. The reproducing head eA is azimuth-angle A, and the reproducing head eB is azimuth-angle B.

[0012] Magnetic tape c is twisted around the peripheral face of rotating-drum d a little aslant by the central angle in the range of about 180 degrees (strictly 180 degrees or more), and while rotating rotating-drum d, the recording tracks T and T and ... which were recorded in the shape of helical one on magnetic tape c will be scanned to each \*\* by the two reproducing heads eA and eB by making it run magnetic tape c.

[0013] And according to the two reproducing heads eA and eB arranged in this way, it becomes reproducible [ recording track T from which the track pitch  $T_p$  differed ] by changing a tape speed.

[0014] That is, spacing (track pitch  $T_p$ ) of recording track Ta and recording track Tb is because it is determined by the tape speed, it will become small when a track pitch  $T_p$  is large when a tape speed is made quick, and it is made late, and it becomes possible to carry out adjustable [ of the recording density of magnetic tape d ] by changing a tape speed by this.

[0015] When reproducing magnetic tape c recorded by 1= 11 micrometers of track pitches  $T_p$ , a tape speed can be set as the 1st mode, recording track T1a, T1b, T1a, T1b, and ... can be sequentially scanned to each \*\* by each reproducing heads eA and eB, and a record signal can be read there (refer to drawing 16 ).

[0016] Moreover, when reproducing magnetic tape c' recorded by 2= 5.5 micrometers of track pitches  $T_p$ , by making it the 2nd mode was doubled [ about 1 / ] rather than the tape speed in the 1st mode of the above, recording track T2a, T2b, T2a, T2b, and ... can be sequentially scanned to each \*\* by each reproducing heads eA and eB, and a record signal can be read (refer to drawing 17 ).

[0017]

[Problem(s) to be Solved by the Invention] By the way, the either always touches magnetic tape c and c', and, as for the reproducing heads eA and eB arranged in this way, always needs to transmit the regenerative signal read by these reproducing heads eA and eB to a stator side from a rotor side, and, as for two reversion system channels gA and gB of the rotary transformer f, the either always operates (refer to drawing 18 ).

[0018] Moreover, at least, one of the reversion system channels gA or eB will have operated, and the power system channel h for supplying power at the reproducing heads eA and eB at the rotary transformer f has the problem that the cross talk of the reversion system channel gA, or the eB and the power system channel h will arise, while this is operating.

[0019] Then, the reproducing head of the couple which differed in the azimuth angle, estranged 180 degrees and has been arranged by the central angle in order that this invention rotating drum may solve the above-mentioned technical problem, It has the rotary transformer equipped with the reversion system channel which transmits a regenerative signal at least, and the power system channel which supplies power to the above-mentioned reproducing head. The power system

channel of this rotary transformer operates in about 180 degrees by the angle of rotation. This power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel Or it differs in this power system channel and a stage of operation, a channel with the smaller part which a stage of operation overlaps is arranged.

[0020] A power system channel and a reversion system channel with the part larger if it is in this invention rotating drum which is the same or overlaps a stage of operation are made to estrange as much as possible. Therefore, and among both channels Since the channel with the smaller part which differs in a stage of operation or overlaps it was made to intervene By a cross talk with the reversion system channel of the stage of operation when a coincidence term or the part to overlap is large not arising, and changing a tape speed, even if the power system channel is operating The recording track with which track pitches differed can be reproduced, and playback of two or more sorts of magnetic tapes recorded by different track pitch can be enabled, as a result playback of the magnetic tape of high recording density can be enabled.

[0021] Moreover, in order that this invention magnetic tape record / regenerative apparatus may solve the above-mentioned technical problem The reproducing head of the couple which differed in the azimuth angle, estranged 180 degrees and has been arranged by the central angle, It has the rotary transformer equipped with the reversion system channel which transmits a regenerative signal at least, and the power system channel which supplies power to the above-mentioned reproducing head. The power system channel of this rotary transformer operates in about 180 degrees by the angle of rotation. This power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel Or it differs in this power system channel and a stage of operation, the part which a stage of operation overlaps prepares the rotating drum which has arranged the channel of the smaller one, and is equipped with two or more sorts of modes about the tape speed of a tape-like record medium.

[0022] Therefore, if it was in this invention magnetic tape record / regenerative apparatus, since a track pitch is not limited by the physical relationship of the reproducing head like before since 180 degrees of reproducing heads of a couple were estranged and they have been arranged by the central angle and it had two or more sorts of modes about the tape speed, by changing a tape speed, a track pitch can be changed and, thereby, densification of recording density can be attained.

[0023]

[Embodiment of the Invention] Below, it explains according to the gestalt of each operation which showed the detail of the magnetic tape record / regenerative apparatus which uses this invention rotating drum and this to the accompanying drawing.

[0024] In addition, the rotating drum, and the magnetic tape record / regenerative apparatus explained with the gestalt of each operation What was applied to the magnetic tape streamer drive equipment known as a data recorder for computers is shown. This magnetic tape streamer drive equipment The function which can confirm whether reproduced the information, recording information on a tape-like record medium, and informational record was performed correctly, In order to have the so-called RAW (Read after Write) function and to realize a RAW function In order to have a recording head and the reproducing head and to transmit transmission of the signal to a recording head, and the signal from the reproducing head, to a rotary transformer, it has a recording system channel and a reversion system channel.

[0025] Drawing 1 thru/or drawing 4 show the gestalt of operation of the 1st of the rotating drum for realizing such a RAW function, and drawing 1 is an outline top view for explaining the physical relationship of each head.

[0026] A rotating drum 1 consists of the rotor side drum 2 and the stator side drum 3 (refer to drawing 2). To the rotor side drum 2 It has two recording heads 4A and 4B and the two reproducing heads 5A and 5B, and 180 degrees of two recording heads 4A and 4B of each other are estranged by the central angle, and by the central angle, 180 degrees of both reproducing heads 5A and 5B are estranged, and each other are arranged (refer to drawing 1 ). Recording head 4A is azimuth-angle A, and recording head 4B is azimuth-angle B, and reproducing-head 5A is azimuth-angle A, and reproducing-head 5B is azimuth-angle B.

[0027] Recording head 4A and reproducing-head 5A vacate predetermined spacing in the direction of a revolving shaft of a rotating drum 1 (the height direction of a rotating drum 1), are arranged, and recording head 4B and reproducing-head 5B as well as recording head 4A and reproducing-head 5A vacate predetermined spacing, and they are arranged. In addition, in drawing 1 , although recording head 4A, reproducing-head 5A or recording head 4B, and reproducing-head 5B were put in order and shown in the hoop direction, this is for expressing each head in a top view. Moreover, although a recording head and every two reproducing heads were prepared in the gestalt of this operation, respectively, this invention is not limited to the number of heads.

[0028] In addition, although the graphic display was omitted, that to which two heads 4A and 4B each, or 5A and 5B touch the magnetic tape 6 is chosen by switching, and it succeeds in transmission of a signal in each channel to which the rotary transformer mentioned later corresponds.

[0029] It is aslant twisted at the include angle of 180 degrees or more to the rotating drum 1, and recording tracks T and T and ... are aslant formed with a predetermined include angle by this, and a magnetic tape 6 will adjoin recording track Ta of azimuth-angle A, and recording track Tb of azimuth-angle B, and will be formed.

[0030] Moreover, the angle of rotation of the recording heads 4A and 4B for forming one recording track T on a magnetic tape 6 is less than 180 degrees, and, thereby, recording track T is formed in the field of mist or small width of face from six magnetic tapes.

[0031] And by the central angle, two recording heads 4A and 4B estrange 180 degrees, and are arranged, and since it is dependent on a tape speed as mentioned above, spacing (track pitch Tp) of recording track Ta and recording track Tb makes a tape speed quick, for make a track pitch Tp small and carrying out densification of the recording density. Moreover, since 180 degrees also of two reproducing heads 5A and 5B are also estranged and they are arranged by the central angle, the above-mentioned recording track can be read with the tape speed, and a RAW function can be realized.

[0032] Transmission of the signal by the side of the rotor of a rotating drum 1, and a stator They are the channels 8a, 8b, 9a, and 9b of each \*\* corresponding to [ it is accomplished by the rotary transformer 7 and ] each heads 4A, 4B, 5A, and 5B in the rotary transformer 7, and the amplifier for reproducing-head 5A and 5B (it mentions later.). It has the short rings 11 and 11 as the power system channel 10 for transmitting power, and a shielding channel for preventing the cross talk from this power system channel 10.

[0033] Each channels 8, 9, 10, and 11 consist of the rotor side element r and the stator side element s, respectively, and the coil wound in the shape of a ring is contained in a circular sulcus, and each [ these ] elements r and s counter mutually, and are arranged.

[0034] And the array of each channel serves as order of the power system channel 10, reversion system channel 9a, the short ring 11, recording system channel 8b, the short ring 11, recording system channel 8a, and reversion system channel 9b from the center-of-rotation side of the rotary transformer 7.

[0035] It connects with the power actuation amplifier 12 and an oscillator circuit 13, and 10s of

stator side elements of the power system channel 10 of the rotary transformer 7 transmits a power signal to rotor side element 10r.

[0036] The power signal transmitted to rotor side element 10r of the power system channel 10 is supplied to the amplifier 16 and 16 for reproducing-head 5A and 5B through rectification and a smoothing circuit 14, and a regulator 15. In addition, although the graphic display was omitted, the capacitor etc. is formed between rectification and the smoothing circuit 14, and the regulator 15, half-revolution part (180 degrees) supply of the rotating drum 1 is carried out, and a power signal is supplied to the amplifier 16 of the after-mentioned [the power by which the above-mentioned capacitor stored electricity a part (180 degrees) for a next half-revolution] of the reproducing head.

[0037] After being amplified with amplifier 16 and 16 and supplying element 9ar and 9br the rotor side of the reversion system channels 9a and 9b, the regenerative signal reproduced by the reproducing heads 5A and 5B is transmitted to element 9as and 9bs the stator side of the reversion system channels 9a and 9b, respectively, and is outputted through the playback amplifier 17 and 17 and equalizers 18 and 18.

[0038] After a record signal is amplified with the record amplifier 19 and 19 arranged in the stator side and is supplied to element 8as and 8bs the stator side of the recording system channels 8a and 8b, it is transmitted to element 8ar and 8br the rotor side of the recording system channels 8a and 8b, respectively, is supplied to recording heads 4A and 4B at each \*\*, and is recorded on a magnetic tape 6.

[0039] Carrying out a deer, the actuation of each channels 8a, 8b, 9a, 9b, and 10 (except for the short rings 11 and 11) is as follows.

[0040] Drawing 4 is a timing chart which shows actuation (condition currently transmitted) of each channels 8a, 8b, 9a, 9b, and 10 (except for the short rings 11 and 11) of the rotary transformer 7.

[0041] Since 180 degrees of two recording heads 4A and 4B are estranged and they are arranged by the central angle in the hoop direction of a rotating drum 1 so that drawing 4 may show, recording system channel 8a or 8b While recording head 4A or 4B touches the magnetic tape 6, a rotating drum 1 operates by the semicircle, and in order that, as for a following part gone half round, recording head 4B or 4A may contact a magnetic tape 6, recording system channel 8b or 8a of another side will operate.

[0042] Thereby, since as for two recording system channels 8a and 8b another side does not have the condition, i.e., overlap in time, of not operating while operating mutually, the cross talk between both is not produced.

[0043] Since 180 degrees of two reproducing heads 5A and 5B are estranged and they are arranged by the central angle in the hoop direction of a rotating drum 1, similarly reversion system channel 9a or 9b While reproducing-head 5A or 5B touches the magnetic tape 6, a rotating drum 1 operates by the semicircle, and in order that, as for a following part gone half round, reproducing-head 5B or 5A may contact a magnetic tape 6, reversion system channel 9b or 9a of another side will operate.

[0044] Thereby, since as for two reversion system channels 9a and 9b another side does not have the condition, i.e., overlap in time, of not operating while operating mutually, the cross talk between both is not produced.

[0045] And although the power system channel 10 operates while recording system channel 8b and reversion system channel 9b are operating It is arranged in the location where reversion system channel 9b which operates at the coincidence term of electric leakage and magnetic leakage which is the easiest to be influenced separated from the power system channel 10 most at the time of actuation of the power system channel 10. And since other channels (recording

system channel 8a and reversion system channel 9a) which are not operating then were made to exist among both, a cross talk does not arise among both.

[0046] Thus, even if it is in this above-mentioned rotating drum 21, since recording heads 4A and 4B and 180 degrees of reproducing heads 5A and 5B were estranged and each other have been arranged, as mentioned above, by changing a tape speed, the recording track of a track pitch Tp with which the track pitch Tp could be easily changed, and various kinds differed can be reproduced, and, moreover, a cross talk does not arise between each channel of the rotary transformer 7.

[0047] Moreover, if it was in the gestalt of this operation, since the power system channel 10 has been arranged in the innermost part of a rotating drum 1, a cross talk with each heads 4a, 4b, 5a, and 5b arranged at the periphery section of a rotating drum 1 can be prevented.

[0048] In addition, even if it replaces the short ring 11 which adjoins recording system channel 8b and this again in the short ring 11 which adjoins reversion system channel 9a and this, respectively, the problem of a cross talk is not produced.

[0049] Furthermore, even if it replaces reversion system channel 9a and recording system channel 8a, the problem of the cross talk between each channel is not produced.

[0050] Drawing 5 is the outline circuit diagram showing modification 7A of the rotary transformer 7, each stator side of recording system channel 8b of this rotary transformer 7A, and reversion system channel 9a, arranges switches 20 and 20 to element 8br and 9ar, respectively, and short-circuits them with them.

[0051] And while the power system channel 10 is operating, by connecting these switches 20 and 20 and short-circuiting element 8ar and 9ar each stator side, these reversion system channel 9a and recording system channel 8a can be operated as a shielding channel, and a cross talk with recording system channel 8b and reversion system channel 9b which operate at a power system channel 10 and coincidence term can be avoided further.

[0052] The point in which drawing 6 thru/drawing 10 show the gestalt of operation of the 2nd of this invention, and the gestalt of this 2nd operation carries out difference as compared with the gestalt of implementation of the above 1st Since it is the point which has arranged the reproducing head and a recording head in the location which shifted to the hoop direction of a rotating drum Only an important section is shown in a drawing and the explanation omits the explanation by attaching the same sign as the sign given to the same part in the rotating drum applied [ point of difference / above-mentioned ] to the gestalt of said 1st operation to each part of a drawing about a dead and other parts.

[0053] A rotating drum 21 consists of the rotor side drum 22 and the stator side drum 23 (refer to drawing 7 ). To the rotor side drum 22 It has two recording heads 24A and 24B and the two reproducing heads 25A and 25B, and 180 degrees of two recording heads 24A and 24B of each other are estranged by the central angle, and by the central angle, 180 degrees of both reproducing heads 25A and 25B are estranged, and each other are arranged (refer to drawing 6 ).

[0054] Recording head 24A and about 45 degrees reproducing-head 25A are estranged to the hoop direction of a rotating drum 21, are arranged in it, and estrange recording head 24B and about 45 degrees reproducing-head 25B as well as recording head 24A and reproducing-head 25A to the hoop direction of a rotating drum 21, and are arranged.

[0055] Transmission of the signal by the side of the rotor of a rotating drum 21, and a stator It is accomplished by the rotary transformer 26. The rotary transformer 26 The channels 27a, 27b, 28a, and 28b of each \*\* corresponding to each heads 24A, 24B, 25A, and 25B, It has the short rings 11 and 11 as the power system channel 10 for transmitting power to the amplifier for reproducing-head 25A and 25B, and a shielding channel for preventing the cross talk from this power system channel 10.

[0056] And the array of each channel serves as order of the power system channel 10, the short ring 11, recording system channel 27a, the short ring 11, recording system channel 27b, reversion system channel 28a, and reversion system channel 28b from the center-of-rotation side of the rotary transformer 26.

[0057] Carrying out a deer, the actuation of each channels 27a, 27b, 28a, 28b, and 10 (except for the short rings 11 and 11) is as follows.

[0058] Drawing 9 is a timing chart which shows actuation (condition currently transmitted) of each channels 27a, 27b, 28a, 28b, and 10 (except for the short rings 11 and 11) of the rotary transformer 26.

[0059] Since 180 degrees of two recording heads 24A and 24B are estranged and they are arranged by the central angle in the hoop direction of a rotating drum 1 so that drawing 9 may show, since it does not overlap in time, the recording system channels 27a and 27b do not produce the cross talk between both like the case of the gestalt of implementation of the above 1st.

[0060] Similarly, since 180 degrees of two reproducing heads 25A and 25B are estranged and they are arranged by the central angle in the hoop direction of a rotating drum 1, since it does not overlap in time, the reversion system channels 28a and 28b do not produce the cross talk between both.

[0061] Moreover, reversion system channel 28b with the big part which overlaps the stage of the power system channel 10 of operation is arranged in the location most distant from the power system channel 10, and since other channels (recording system channel 27a and reversion system channel 28a) with the small part which the stage when does not operate then or it operates moreover overlaps were made to exist among both, a cross talk does not produce it among both.

[0062] In addition, although recording system channel 27b which operates at a power system channel 10 and coincidence term has the possibility of a cross talk in time, among both, recording system channel 27a and the short ring 11 which differ in these and a stage of operation intervene, and since these function as a shielding channel, the cross talk between both is not produced.

[0063] Moreover, although recording system channel 27a, 27b and reversion system channel 28a, or 28b will overlap in time and will operate since 45 degrees shifts and it is mutually arranged by the central angle, recording head 24A, 24B and reproducing-head 25A, or 25B Since recording system channel 27b and the short ring 11 which differ in these and a stage of operation intervene between recording system channel 27a and reversion system channel 28a and these function as a shielding channel, Since the cross talk between both is not produced, but reversion system channel 28a which differs in these and a stage of operation intervenes between recording system channel 27b and reversion system channel 28b and this functions as a shielding channel, The cross talk between both is produced.

[0064] Thus, even if it is in this above-mentioned rotating drum 21, since recording heads 24A and 24B and 180 degrees of reproducing heads 25A and 25B were estranged and each other have been arranged, as mentioned above, by changing a tape speed, the recording track of a track pitch  $T_p$  with which the track pitch  $T_p$  could be easily changed, and various kinds differed can be reproduced, and, moreover, a cross talk does not arise between each channel of the rotary transformer 26.

[0065] Drawing 10 is timing-chart drawing showing the modification about the stage of each channel in the gestalt of implementation of the above 2nd of operation.

[0066] The point in which this modification carries out difference to the gestalt of implementation of the above 2nd is a point of having shifted the phase [ channel / a power system channel and / recording system ] of operation, and having doubled the phase [ channel / a

power system channel and / reversion system ] of operation.

[0067] According to this modification, a change-over of a power system channel of operation and a change-over of two reversion system channels of operation will be made into a coincidence term. Can set to one the reversion system channel which operates at the stage of a power system channel of operation, and, therefore, only by arranging other channels which differ in a stage of operation only between this reversion system channel and a power system channel It becomes unnecessary to be able to ensure prevention of a cross talk and to arrange the power system channel which makes these actuation stage the same, and a reversion system channel in the location estranged most, and the degree of freedom of a design can be raised.

[0068] Moreover, in the gestalt of each above-mentioned implementation, although what has arranged the power system channel to the inner circumference side of a rotating drum was explained, as for this invention, not only this but the power system channel may be arranged at the periphery side of a rotating drum.

[0069] Furthermore, this invention can consider arrangement as shown table 1 not only about a thing but about each channel shown in the gestalt and modification of the above-mentioned implementation.

[0070]

[A table 1]

演	I	II	III	ホ	
A	パワーチャンネル	パワーチャンネル	パワーチャンネル	再生系chB	再生系chB
B	再生系chAとショートリングの組合せ	記録系chAとショートリングの組合せ	記録系chAとショートリングの組合せ	記録系chAとショートリングの組合せ	再生系chAとショートリングの組合せ
C	再生系chB	記録系chB	再生系chB	パワーチャンネル	パワーチャンネル
D	記録系chAとショートリングの組合せ	再生系chAとショートリングの組合せ	再生系chAとショートリングの組合せ	記録系chAとショートリングの組合せ	記録系chAとショートリングの組合せ
E	再生系chB	再生系chB	記録系chB	記録系chB	記録系chB

[0071] In addition, in a table 1, a column (A-G) is the slot of a rotary transformer, and Slot G shows [ Slot A ] a periphery side an inner circumference side. Moreover, the horizontal column (I - HO) shows the example of a pattern of arrangement of each channel.

[0072] Having described "Put together as a reversion system or a recording system channel, and a short ring" into B slot of each pattern, C slot and E slot, and F slot shows that the any may be inner circumference or periphery sides, if the reversion system or the recording system channel, and the short ring are arranged together with the direction of a path.

[0073] Here, although it is effective that the effect of the electric leakage of a power system channel and magnetic leakage separates the largest reversion system channel from a power system channel, when the transmission power of a power system channel is small, a power system channel may be arranged like pattern (d) and (e) in the middle of the slot located in a line in the direction of a path.

[0074] Moreover, since a cross talk may be carried out among both channels when the part which the phase of actuation of a power system channel and actuation of a reversion system channel is not in agreement, and overlaps is large, it is effective to detach both channels as much as possible like pattern (\*\*), (\*\*), and (Ha), and, as for each, being located is desirable to an inner circumference and periphery side.

[0075] In addition, in the gestalt of the above-mentioned implementation, although the rotating drum equipped with the reproducing head and a recording head was explained, this invention is applicable not only to this but the rotary head equipped only with the reproducing head.

[0076] Moreover, this invention is not restricted to the magnetic tape streamer drive equipment known as a data recorder for computers, but can be widely applied to the thing equipped with the function (RAW function) which checks information recorded while recording magnetic TEPUHE information.

[0077] Furthermore, it does not pass over the concrete configuration thru/or the structure of each part shown in the above mentioned gestalt and each above mentioned modification of each operation to what showed a mere example of the somatization which hits carrying out this invention, and the technical range of this invention is not restrictively interpreted by these.

[0078]

[Effect of the Invention] As indicated above this invention rotating drum The reproducing head of the couple which differed in the azimuth angle, estranged 180 degrees and has been arranged by the central angle, It has the rotary transformer equipped with the reversion system channel which transmits a regenerative signal at least, and the power system channel which supplies power to the above-mentioned reproducing head. The power system channel of this rotary transformer operates in 180 degrees by the angle of rotation. This power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel Or it differs in this power system channel and a stage of operation, it is characterized by having arranged the channel with the smaller part which a stage of operation overlaps.

[0079] Therefore, if it was in this invention rotating drum, since 180 degrees of reproducing heads were made to estrange and they have been arranged While making possible reading of the magnetic tape with which track pitches differ A power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel Since the channel with the smaller part which a stage of operation overlaps has been arranged or it differed in this power system channel and the stage of operation, it can prevent that the cross talk in a rotary transformer arises.

[0080] Since invention indicated claim 2 has arranged by turns the channel which makes a stage of operation the same, and the channel which differs in a stage of operation, it can realize the so-called RAW machine by applying to a rotating drum with a recording head.

[0081] Since invention indicated to claim 3 has arranged the channel with the larger part which overlaps the stage of a power system channel of operation, and the channel with the smaller part to overlap by turns, it can realize the so-called RAW machine by applying to a rotating drum with a recording head.

[0082] Since the part which a power system channel, the channel which differs in a stage of operation, or a stage of operation overlaps short-circuited the channel of the smaller one in the non-operating stage and made the closed circuit invention indicated to claim 4, it can operate these channels effectively as a shielding channel, and can make prevention of the cross talk of a rotary transformer a more positive thing.

[0083] Since invention indicated to claim 5 thru/or claim 8 prepared the shielding channel between the power system channel and the channel with the larger part which a this and coincidence term or a stage of operation overlaps, it can make a more positive thing prevention of the cross talk in a rotary transformer.

[0084] Invention indicated to claim 9 differs in an azimuth angle, has the rotary transformer equipped with the recording system channel which transmits a record signal to the recording

head and this recording head of the couple which estranged 180 degrees and has been arranged by the central angle, and since it prepared the shielding channel between the recording system channel and the reversion system channel with the larger part which a this and coincidence term or a stage of operation overlaps, it can realize the so-called RAW machine.

[0085] Moreover, the reproducing head of the couple which this invention magnetic tape record / regenerative apparatus differed in the azimuth angle, and estranged 180 ddegrees and has been arranged by the central angle, It has the rotary transformer equipped with the reversion system channcl which transmits a regenerative signal at least, and the power system channel which supplies power to the above-mentioned reproducing head. The power system channel of this rotary transformer operates in 180 degrees by the angle of rotation. This power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel Or it differs in this power system channel and a stage of operation, the rotating drum which has arranged the channel with the smaller part which a stage of operation overlaps is prepared, and it is characterized by having two or more sorts of modes about the tape speed of a tape-like record medium.

[0086] Therefore, if it is in this invention magnetic tape record / regenerative apparatus Since 180 degrees of reproducing heads of a couple were estranged, they are arranged by the central angle and it had two or more sorts of modes about the tape speed While making possible reading of the various magnetic tapes with which track pitches differed by changing a tape speed A power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel Since the channel with the smaller part which a stage of operation overlaps has been arranged or it differed in this power system channel and the stage of operation, it can prevent that the cross talk in a rotary transformer arises.

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## TECHNICAL FIELD

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[Field of the Invention] This invention relates to the magnetic tape record / regenerative apparatus which used a rotating drum and this. It is related with the technique which plays two or more sorts of magnetic tapes with which the track pitches of the recording track recorded on the magnetic tape in the shape of helical one specifically differ.

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## PRIOR ART

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[Description of the Prior Art] Two trucks with which azimuth angles differ usually adjoin, and the recording track recorded on the magnetic tape is formed by the predetermined track pitch, and one recording track is formed in [ of a rotating drum ] about 180 degrees.

[0003] Drawing 11 thru/or drawing 14 show an example of the conventional rotating-drum a, and drawing 11 is an outline top view for explaining the physical relationship of each head.

[0004] playback of this recording track -- rotating-drum a -- the homotopic of the hoop direction -- and it is performed in the direction of a revolving shaft (the height direction of rotating-drum a) by the 1 track pitch Tp by the two reproducing heads bA and bB estranged and arranged. The reproducing head bA is azimuth-angle A, and the reproducing head bB is azimuth-angle B.

[0005] In addition, the regenerative signal read by such the two reproducing heads bA and bB is transmitted to a stator side from a rotor side by the reversion system channel of a rotary transformer. Moreover, it is necessary to supply power to the reproducing heads bA and bB, a power system channel is prepared in a rotary transformer, and power is supplied to a rotor side by this power system channel from a stator side.

[0006] And by arranging the reproducing heads bA and bB in the hoop direction of rotating-drum a at homotopic, as for a reversion system channel, since it is about 180 degrees in the hoop direction of rotating-drum a, as for the contact to magnetic tape c of the reproducing heads bA and bB, the above-mentioned reversion system channel operates by the first half-revolution (180 degrees) among 1 revolutions (360 degrees) of rotating-drum a, and it operates in the next half-revolution (180 degrees) (refer to drawing 14).

[0007] Moreover, actuation of a power system channel is performed while the reversion system channel is not operating, a capacitor etc. stores electricity the power and it is usually used for reading of the signal by the reproducing heads bA and bB. This is for preventing that a cross talk arises between the reversion system channel of a rotary transformer, and a power system channel, when a power system channel and a reversion system channel operate simultaneously (refer to drawing 14 ).

[0008] However, if it is in such rotating-drum a, if the amount of gaps of the height direction of rotating-drum a sets to 11 micrometers (refer to drawing 12 ), since the two reproducing heads bA and bB will be set to track pitch  $T_p=1$  micrometer (refer to drawing 13 ), a track pitch  $T_p$  can reproduce only 1 kind of magnetic tape c, and they cannot reproduce several sorts magnetic tape c from which a track pitch  $T_p$  differs.

[0009] Then, what estranged 180 degrees of reproducing heads to the hoop direction of a rotating drum, and has arranged them to it can be considered.

[0010] Drawing 15 is the outline top view showing rotating-drum d equipped with the two reproducing heads which estranged 180 degrees to the hoop direction and have been arranged in this way in it.

[0011] By the central angle, the two reproducing heads eA and eB estrange 180 degrees in rotating-drum d, and are arranged in it. The reproducing head eA is azimuth-angle A, and the reproducing head eB is azimuth-angle B.

[0012] Magnetic tape c is twisted around the peripheral face of rotating-drum d a little aslant by the central angle in the range of about 180 degrees (strictly 180 degrees or more), and while rotating rotating-drum d, the recording tracks T and T and ... which were recorded in the shape of helical one on magnetic tape c will be scanned to each \*\* by the two reproducing heads eA and eB by making it run magnetic tape c.

[0013] And according to the two reproducing heads eA and eB arranged in this way, it becomes reproducible [ recording track T from which the track pitch  $T_p$  differed ] by changing a tape speed.

[0014] That is, spacing (track pitch  $T_p$ ) of recording track Ta and recording track Tb is because it is determined by the tape speed, it will become small when a track pitch  $T_p$  is large when a tape speed is made quick, and it is made late, and it becomes possible to carry out adjustable [ of the recording density of magnetic tape d ] by changing a tape speed by this.

[0015] When reproducing magnetic tape c recorded by  $1=11$  micrometers of track pitches  $T_p$ , a tape speed can be set as the 1st mode, recording track T1a, T1b, T1a, T1b, and ... can be sequentially scanned to each \*\* by each reproducing heads eA and eB, and a record signal can be read there (refer to drawing 16 ).

[0016] Moreover, when reproducing magnetic tape c' recorded by  $2=5.5$  micrometers of track pitches  $T_p$ , by making it the 2nd mode was doubled [ about 1 / ] rather than the tape speed in the

1st mode of the above, recording track T2a, T2b, T2a, T2b, and ... can be sequentially scanned to each \*\* by each reproducing heads cA and cB, and a record signal can be read (refer to drawing 17).

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## EFFECT OF THE INVENTION

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[Effect of the Invention] As indicated above this invention rotating drum The reproducing head of the couple which differed in the azimuth angle, estranged 180 degrees and has been arranged by the central angle, It has the rotary transformer equipped with the reversion system channel which transmits a regenerative signal at least, and the power system channel which supplies power to the above-mentioned reproducing head. The power system channel of this rotary transformer operates in 180 degrees by the angle of rotation. This power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel Or it differs in this power system channel and a stage of operation, it is characterized by having arranged the channel with the smaller part which a stage of operation overlaps.

[0079] Therefore, if it was in this invention rotating drum, since 180 degrees of reproducing heads were made to estrange and they have been arranged While making possible reading of the magnetic tape with which track pitches differ A power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel Since the channel with the smaller part which a stage of operation overlaps has been arranged or it differed in this power system channel and the stage of operation, it can prevent that the cross talk in a rotary transformer arises.

[0080] Since invention indicated claim 2 has arranged by turns the channel which makes a stage of operation the same, and the channel which differs in a stage of operation, it can realize the so-called RAW machine by applying to a rotating drum with a recording head.

[0081] Since invention indicated to claim 3 has arranged the channel with the larger part which overlaps the stage of a power system channel of operation, and the channel with the smaller part to overlap by turns, it can realize the so-called RAW machine by applying to a rotating drum with a recording head.

[0082] Since the part which a power system channel, the channel which differs in a stage of operation, or a stage of operation overlaps short-circuited the channel of the smaller one in the non-operating stage and made the closed circuit invention indicated to claim 4, it can operate these channels effectively as a shielding channel, and can make prevention of the cross talk of a rotary transformer a more positive thing.

[0083] Since invention indicated to claim 5 thru/or claim 8 prepared the shielding channel between the power system channel and the channel with the larger part which a this and coincidence term or a stage of operation overlaps, it can make a more positive thing prevention of the cross talk in a rotary transformer.

[0084] Invention indicated to claim 9 differs in an azimuth angle, has the rotary transformer equipped with the recording system channel which transmits a record signal to the recording head and this recording head of the couple which estranged 180 degrees and has been arranged by the central angle, and since it prepared the shielding channel between the recording system channel and the reversion system channel with the larger part which a this and coincidence term or a stage of operation overlaps, it can realize the so-called RAW machine.

[0085] Moreover, the reproducing head of the couple which this invention magnetic tape record / regenerative apparatus differed in the azimuth angle, and estranged 180 degrees and has been arranged by the central angle, It has the rotary transformer equipped with the reversion system channel which transmits a regenerative signal at least, and the power system channel which supplies power to the above-mentioned reproducing head. The power system channel of this rotary transformer operates in 180 degrees by the angle of rotation. This power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel Or it differs in this power system channel and a stage of operation, the rotating drum which has arranged the channel with the smaller part which a stage of operation overlaps is prepared, and it is characterized by having two or more sorts of modes about the tape speed of a tape-like record medium.

[0086] Therefore, if it is in this invention magnetic tape record / regenerative apparatus Since 180 degrees of reproducing heads of a couple were estranged, they are arranged by the central angle and it had two or more sorts of modes about the tape speed While making possible reading of the various magnetic tapes with which track pitches differed by changing a tape speed A power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel Since the channel with the smaller part which a stage of operation overlaps has been arranged or it differed in this power system channel and the stage of operation, it can prevent that the cross talk in a rotary transformer arises.

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#### TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] By the way, the either always touches magnetic tape c and c', and, as for the reproducing heads eA and eB arranged in this way, always needs to transmit the regenerative signal read by these reproducing heads eA and eB to a stator side from a rotor side, and, as for two reversion system channels gA and gB of the rotary transformer f, the either always operates (refer to drawing 18 ).

[0018] Moreover, at least, one of the reversion system channels gA or eB will have operated, and the power system channel h for supplying power at the reproducing heads eA and eB at the rotary transformer f has the problem that the cross talk of the reversion system channel gA, or the eB and the power system channel h will arise, while this is operating.

[0019] Then, the reproducing head of the couple which differed in the azimuth angle, estranged 180 degrees and has been arranged by the central angle in order that this invention rotating drum may solve the above-mentioned technical problem, It has the rotary transformer equipped with the reversion system channel which transmits a regenerative signal at least, and the power system channel which supplies power to the above-mentioned reproducing head. The power system channel of this rotary transformer operates in about 180 degrees by the angle of rotation. This power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel Or it differs in this power system channel and a stage of operation, a channel with the smaller part which a stage of operation overlaps is arranged.

[0020] A power system channel and a reversion system channel with the part larger if it is in this invention rotating drum which is the same or overlaps a stage of operation are made to estrange as much as possible. Therefore, and among both channels Since the channel with the smaller part which differs in a stage of operation or overlaps it was made to intervene By a cross talk with the

reversion system channel of the stage of operation when a coincidence term or the part to overlap is large not arising, and changing a tape speed, even if the power system channel is operating. The recording track with which track pitches differed can be reproduced, and playback of two or more sorts of magnetic tapes recorded by different track pitch can be enabled, as a result playback of the magnetic tape of high recording density can be enabled.

[0021] Moreover, in order that this invention magnetic tape record / regenerative apparatus may solve the above-mentioned technical problem The reproducing head of the couple which differed in the azimuth angle, estranged 180 degrees and has been arranged by the central angle, It has the rotary transformer equipped with the reversion system channel which transmits a regenerative signal at least, and the power system channel which supplies power to the above-mentioned reproducing head. The power system channel of this rotary transformer operates in about 180 degrees by the angle of rotation. This power system channel and a stage of operation between a reversion system channel with the larger part which the reversion system channel or the stage of operation made the same overlaps, and a power system channel Or it differs in this power system channel and a stage of operation, the part which a stage of operation overlaps prepares the rotating drum which has arranged the channel of the smaller one, and is equipped with two or more sorts of modes about the tape speed of a tape-like record medium.

[0022] Therefore, if it was in this invention magnetic tape record / regenerative apparatus, since a track pitch is not limited by the physical relationship of the reproducing head like before since 180 degrees of reproducing heads of a couple were estranged and they have been arranged by the central angle and it had two or more sorts of modes about the tape speed, by changing a tape speed, a track pitch can be changed and, thereby, densification of recording density can be attained.

[0023]

[Embodiment of the Invention] Below, it explains according to the gestalt of each operation which showed the detail of the magnetic tape record / regenerative apparatus which uses this invention rotating drum and this to the accompanying drawing.

[0024] In addition, the rotating drum, and the magnetic tape record / regenerative apparatus explained with the gestalt of each operation What was applied to the magnetic tape streamer drive equipment known as a data recorder for computers is shown. This magnetic tape streamer drive equipment The function which can confirm whether reproduced the information, recording information on a tape-like record medium, and informational record was performed correctly, In order to have the so-called RAW (Read after Write) function and to realize a RAW Function In order to have a recording head and the reproducing head and to transmit transmission of the signal to a recording head, and the signal from the reproducing head, to a rotary transformer, it has a recording system channel and a reversion system channel.

[0025] Drawing 1 thru/or drawing 4 show the gestalt of operation of the 1st of the rotating drum for realizing such a RAW function, and drawing 1 is an outline top view for explaining the physical relationship of each head.

[0026] A rotating drum 1 consists of the rotor side drum 2 and the stator side drum 3 (refer to drawing 2 ). To the rotor side drum 2 It has two recording heads 4A and 4B and the two reproducing heads 5A and 5B, and 180 degrees of two recording heads 4A and 4B of each other are estranged by the central angle, and by the central angle, 180 degrees of both reproducing heads 5A and 5B are estranged, and each other are arranged (refer to drawing 1 ). Recording head 4A is azimuth-angle A, and recording head 4B is azimuth-angle B, and reproducing-head 5A is azimuth-angle A, and reproducing-head 5B is azimuth-angle B.

[0027] Recording head 4A and reproducing-head 5A vacate predetermined spacing in the direction of a revolving shaft of a rotating drum 1 (the height direction of a rotating drum 1), are

arranged, and recording head 4B and reproducing-head 5B as well as recording head 4A and reproducing-head 5A vacate predetermined spacing, and they are arranged. In addition, in drawing 1 , although recording head 4A, reproducing-head 5A or recording head 4B, and reproducing-head 5B were put in order and shown in the hoop direction, this is for expressing each head in a top view. Moreover, although a recording head and every two reproducing heads were prepared in the gestalt of this operation, respectively, this invention is not limited to the number of heads.

[0028] In addition, although the graphic display was omitted, that to which two heads 4A and 4B each, or 5A and 5B touch the magnetic tape 6 is chosen by switching, and it succeeds in transmission of a signal in each channel to which the rotary transformer mentioned later corresponds.

[0029] It is aslant twisted at the include angle of 180 degrees or more to the rotating drum 1, and recording tracks T and T and ... are aslant formed with a predetermined include angle by this, and a magnetic tape 6 will adjoin recording track Ta of azimuth-angle A, and recording track Tb of azimuth-angle B, and will be formed.

[0030] Moreover, the angle of rotation of the recording heads 4A and 4B for forming one recording track T on a magnetic tape 6 is less than 180 degrees, and, thereby, recording track T is formed in the field of mist or small width of face from six magnetic tapes.

[0031] And by the central angle, two recording heads 4A and 4B estrange 180 degrees, and are arranged, and since it is dependent on a tape speed as mentioned above, spacing (track pitch Tp) of recording track Ta and recording track Tb makes a tape speed quick, for make a track pitch Tp small and carrying out densification of the recording density. Moreover, since 180 degrees also of two reproducing heads 5A and 5B are also estranged and they are arranged by the central angle, the above-mentioned recording track can be read with the tape speed, and a RAW function can be realized.

[0032] Transmission of the signal by the side of the rotor of a rotating drum 1, and a stator They are the channels 8a, 8b, 9a, and 9b of each \*\* corresponding to [ it is accomplished by the rotary transformer 7 and ] each heads 4A, 4B, 5A, and 5B in the rotary transformer 7, and the amplifier for reproducing-head 5A and 5B (it mentions later.). It has the short rings 11 and 11 as the power system channel 10 for transmitting power, and a shielding channel for preventing the cross talk from this power system channel 10.

[0033] Each channels 8, 9, 10, and 11 consist of the rotor side element r and the stator side element s, respectively, and the coil wound in the shape of a ring is contained in a circular sulcus, and each [ these ] elements r and s counter mutually, and are arranged.

[0034] And the array of each channel serves as order of the power system channel 10, reversion system channel 9a, the short ring 11, recording system channel 8b, the short ring 11, recording system channel 8a, and reversion system channel 9b from the center-of-rotation side of the rotary transformer 7.

[0035] It connects with the power actuation amplifier 12 and an oscillator circuit 13, and 10s of stator side elements of the power system channel 10 of the rotary transformer 7 transmits a power signal to rotor side element 10r.

[0036] The power signal transmitted to rotor side element 10r of the power system channel 10 is supplied to the amplifier 16 and 16 for reproducing-head 5A and 5B through rectification and a smoothing circuit 14, and a regulator 15. In addition, although the graphic display was omitted, the capacitor etc. is formed between rectification and the smoothing circuit 14, and the regulator 15, half-revolution part (180 degrees) supply of the rotating drum 1 is carried out, and a power signal is supplied to the amplifier 16 of the after-mentioned [ the power by which the above-mentioned capacitor stored electricity a part (180 degrees) for a next half-revolution ] of the

reproducing head.

[0037] After being amplified with amplifier 16 and 16 and supplying element 9ar and 9br the rotor side of the reversion system channels 9a and 9b, the regenerative signal reproduced by the reproducing heads 5A and 5B is transmitted to element 9as and 9bs the stator side of the reversion system channels 9a and 9b, respectively, and is outputted through the playback amplifier 17 and 17 and equalizers 18 and 18.

[0038] After a record signal is amplified with the record amplifier 19 and 19 arranged in the stator side and is supplied to element 8as and 8bs the stator side of the recording system channels 8a and 8b, it is transmitted to element 8ar and 8br the rotor side of the recording system channels 8a and 8b, respectively, is supplied to recording heads 4A and 4B at each \*\*, and is recorded on a magnetic tape 6.

[0039] Carrying out a deer, the actuation of each channels 8a, 8b, 9a, 9b, and 10 (except for the short rings 11 and 11) is as follows.

[0040] Drawing 4 is timing chart which shows actuation (condition currently transmitted) of each channels 8a, 8b, 9a, 9b, and 10 (except for the short rings 11 and 11) of the rotary transformer 7.

[0041] Since 180 degrees of two recording heads 4A and 4B are estranged and they are arranged by the central angle in the hoop direction of a rotating drum 1 so that drawing 4 may show, recording system channel 8a or 8b While recording head 4A or 4B touches the magnetic tape 6, a rotating drum 1 operates by the semicircle, and in order that, as for a following part gone half round, recording head 4B or 4A may contact a magnetic tape 6, recording system channel 8b or 8a of another side will operate.

[0042] Thereby, since as for two recording system channels 8a and 8b another side does not have the condition, i.e., overlap in time, of not operating while operating mutually, the cross talk between both is not produced.

[0043] Since 180 degrees of two reproducing heads 5A and 5B are estranged and they are arranged by the central angle in the hoop direction of a rotating drum 1, similarly reversion system channel 9a or 9b While reproducing-head 5A or 5B touches the magnetic tape 6, a rotating drum 1 operates by the semicircle, and in order that, as for a following part gone half round, reproducing-head 5B or 5A may contact a magnetic tape 6, reversion system channel 9b or 9a of another side will operate.

[0044] Thereby, since as for two reversion system channels 9a and 9b another side does not have the condition, i.e., overlap in time, of not operating while operating mutually, the cross talk between both is not produced.

[0045] And although the power system channel 10 operates while recording system channel 8b and reversion system channel 9b are operating It is arranged in the location where reversion system channel 9b which operates at the coincidence term of electric leakage and magnetic leakage which is the easiest to be influenced separated from the power system channel 10 most at the time of actuation of the power system channel 10. And since other channels (recording system channel 8a and reversion system channel 9a) which are not operating then were made to exist among both, a cross talk does not arise among both.

[0046] Thus, even if it is in this above-mentioned rotating drum 21, since recording heads 4A and 4B and 180 degrees of reproducing heads 5A and 5B were estranged and each other have been arranged, as mentioned above, by changing a tape speed, the recording track of a track pitch  $T_p$  with which the track pitch  $T_p$  could be easily changed, and various kinds differed can be reproduced, and, moreover, a cross talk does not arise between each channel of the rotary transformer 7.

[0047] Moreover, if it was in the gestalt of this operation, since the power system channel 10 has

been arranged in the innermost part of a rotating drum 1, a cross talk with each heads 4a, 4b, 5a, and 5b arranged at the periphery section of a rotating drum 1 can be prevented.

[0048] In addition, even if it replaces the short ring 11 which adjoins recording system channel 8b and this again in the short ring 11 which adjoins reversion system channel 9a and this, respectively, the problem of a cross talk is not produced.

[0049] Furthermore, even if it replaces reversion system channel 9a and recording system channel 8a, the problem of the cross talk between each channel is not produced.

[0050] Drawing 5 is the outline circuit diagram showing modification 7A of the rotary transformer 7, each stator side of recording system channel 8b of this rotary transformer 7A, and reversion system channel 9a, arranges switches 20 and 20 to element 8br and 9ar, respectively, and short-circuits them with them.

[0051] And while the power system channel 10 is operating, by connecting these switches 20 and 20 and short-circuiting element 8ar and 9ar each stator side, these reversion system channel 9a and recording system channel 8a can be operated as a shielding channel, and a cross talk with recording system channel 8b and reversion system channel 9b which operate at a power system channel 10 and coincidence term can be avoided further.

[0052] The point in which drawing 6 thru/or drawing 10 show the gestalt of operation of the 2nd of this invention, and the gestalt of this 2nd operation carries out difference as compared with the gestalt of implementation of the above 1st Since it is the point which has arranged the reproducing head and a recording head in the location which shifted to the hoop direction of a rotating drum Only an important section is shown in a drawing and the explanation omits the explanation by attaching the same sign as the sign given to the same part in the rotating drum applied [ point of difference / above-mentioned ] to the gestalt of said 1st operation to each part of a drawing about a deed and other parts.

[0053] A rotating drum 21 consists of the rotor side drum 22 and the stator side drum 23 (refer to drawing 7). To the rotor side drum 22 It has two recording heads 24A and 24B and the two reproducing heads 25A and 25B, and 180 degrees of two recording heads 24A and 24B of each other are estranged by the central angle, and by the central angle, 180 degrees of both reproducing heads 25A and 25B are estranged, and each other are arranged (refer to drawing 6 ).

[0054] Recording head 24A and about 45 degrees reproducing-head 25A are estranged to the hoop direction of a rotating drum 21, are arranged in it, and estrange recording head 24B and about 45 degrees reproducing-head 25B as well as recording head 24A and reproducing-head 25A to the hoop direction of a rotating drum 21, and are arranged.

[0055] Transmission of the signal by the side of the rotor of a rotating drum 21, and a stator It is accomplished by the rotary transformer 26. The rotary transformer 26 The channels 27a, 27b, 28a, and 28b of each \*\* corresponding to each heads 24A, 24B, 25A, and 25B, It has the short rings 11 and 11 as the power system channel 10 for transmitting power to the amplifier for reproducing-head 25A and 25B, and a shielding channel for preventing the cross talk from this power system channel 10.

[0056] And the array of each channel serves as order of the power system channel 10, the short ring 11, recording system channel 27a, the short ring 11, recording system channel 27b, reversion system channel 28a, and reversion system channel 28b from the center-of-rotation side of the rotary transformer 26.

[0057] Carrying out a deer, the actuation of each channels 27a, 27b, 28a, 28b, and 10 (except for the short rings 11 and 11) is as follows.

[0058] Drawing 9 is a timing chart which shows actuation (condition currently transmitted) of each channels 27a, 27b, 28a, 28b, and 10 (except for the short rings 11 and 11) of the rotary transformer 26.

[0059] Since 180 degrees of two recording heads 24A and 24B are estranged and they are arranged by the central angle in the hoop direction of a rotating drum 1 so that drawing 9 may show, since it does not overlap in time, the recording system channels 27a and 27b do not produce the cross talk between both like the case of the gestalt of implementation of the above 1st.

[0060] Similarly, since 180 degrees of two reproducing heads 25A and 25B are estranged and they are arranged by the central angle in the hoop direction of a rotating drum 1, since it does not overlap in time, the reversion system channels 28a and 28b do not produce the cross talk between both.

[0061] Moreover, reversion system channel 28b with the big part which overlaps the stage of the power system channel 10 of operation is arranged in the location most distant from the power system channel 10, and since other channels (recording system channel 27a and reversion system channel 28a) with the small part which the stage when does not operate then or it operates moreover overlaps were made to exist among both, a cross talk does not produce it among both.

[0062] In addition, although recording system channel 27b which operates at a power system channel 10 and coincidence term has the possibility of a cross talk in time, among both, recording system channel 27a and the short ring 11 which differ in these and a stage of operation intervene, and since these function as a shielding channel, the cross talk between both is not produced.

[0063] Moreover, although recording system channel 27a, 27b and reversion system channel 28a, or 28b will overlap in time and will operate since 45 degrees shifts and it is mutually arranged by the central angle, recording head 24A, 24B and reproducing-head 25A, or 25B Since recording system channel 27b and the short ring 11 which differ in these and a stage of operation intervene between recording system channel 27a and reversion system channel 28a and these function as a shielding channel, Since the cross talk between both is not produced, but reversion system channel 28a which differs in these and a stage of operation intervenes between recording system channel 27b and reversion system channel 28b and this functions as a shielding channel, The cross talk between both is produced.

[0064] Thus, even if it is in this above-mentioned rotating drum 21, since recording heads 24A and 24B and 180 degrees of reproducing heads 25A and 25B were estranged and each other have been arranged, as mentioned above, by changing a tape speed, the recording track of a track pitch  $T_p$  with which the track pitch  $T_p$  could be easily changed, and various kinds differed can be reproduced, and, moreover, a cross talk does not arise between each channel of the rotary transformer 26.

[0065] Drawing 10 is timing-chart drawing showing the modification about the stage of each channel in the gestalt of implementation of the above 2nd of operation.

[0066] The point in which this modification carries out difference to the gestalt of implementation of the above 2nd is a point of having shifted the phase [ channel / a power system channel and / recording system ] of operation, and having doubled the phase [ channel / a power system channel and / reversion system ] of operation.

[0067] According to this modification, a change-over of a power system channel of operation and a change-over of two reversion system channels of operation will be made into a coincidence term. Can set to one the reversion system channel which operates at the stage of a power system channel of operation, and, therefore, only by arranging other channels which differ in a stage of operation only between this reversion system channel and a power system channel It becomes unnecessary to be able to ensure prevention of a cross talk and to arrange the power system channel which makes these actuation stage the same, and a reversion system channel in the location estranged most, and the degree of freedom of a design can be raised.

[0068] Moreover, in the gestalt of each above-mentioned implementation, although what has arranged the power system channel to the inner circumference side of a rotating drum was explained, as for this invention, not only this but the power system channel may be arranged at the periphery side of a rotating drum.

[0069] Furthermore, this invention can consider arrangement as shown table 1 not only about a thing but about each channel shown in the gestalt and modification of the above-mentioned implementation.

[0070]

[A table 1]

溝	イ	ロ	ハ	ニ	ホ
A	バ'ワ-系ch	バ'ワ-系ch	バ'ワ-系ch	再生系chB	再生系chB
B	再生系chAと ショートリンク'の 組合せ	記録系chAと ショートリンク'の 組合せ	記録系chAと ショートリンク'の 組合せ	再生系chAと ショートリンク'の 組合せ	再生系chAと ショートリンク'の 組合せ
C					
D	再生系chB	記録系chB	再生系chB	バ'ワ-系ch	バ'ワ-系ch
E	記録系chAと ショートリンク'の 組合せ	再生系chAと ショートリンク'の 組合せ	再生系chAと ショートリンク'の 組合せ	再生系chAと ショートリンク'の 組合せ	記録系chAと ショートリンク'の 組合せ
F					
G	記録系chB	再生系chB	記録系chB	記録系chB	記録系chB

[0071] In addition, in a table 1, a column (A-G) is the slot of a rotary transformer, and Slot G shows [ Slot A ] a periphery side an inner circumference side. Moreover, the horizontal column (I - HO) shows the example of a pattern of arrangement of each channel.

[0072] Having described "Put together as a reversion system or a recording system channel, and a short ring" into B slot of each pattern, C slot and E slot, and F slot shows that the any may be inner circumference or periphery sides, if the reversion system or the recording system channel, and the short ring are arranged together with the direction of a path.

[0073] Here, although it is effective that the effect of the electric leakage of a power system channel and magnetic leakage separates the largest reversion system channel from a power system channel, when the transmission power of a power system channel is small, a power system channel may be arranged like pattern (d) and (e) in the middle of the slot located in a line in the direction of a path.

[0074] Moreover, since a cross talk may be carried out among both channels when the part which the phase of actuation of a power system channel and actuation of a reversion system channel is not in agreement, and overlaps is large, it is effective to detach both channels as much as possible like pattern (\*\*), (\*\*), and (Ha), and, as for each, being located is desirable to an inner circumference and periphery side.

[0075] In addition, in the gestalt of the above-mentioned implementation, although the rotating drum equipped with the reproducing head and a recording head was explained, this invention is applicable not only to this but the rotary head equipped only with the reproducing head.

[0076] Moreover, this invention is not restricted to the magnetic tape streamer drive equipment known as a data recorder for computers, but can be widely applied to the thing equipped with the function (RAW function) which checks information recorded while recording magnetic TEPUHE information.

[0077] Furthermore, it does not pass over the concrete configuration thru/or the structure of each part shown in the above mentioned gestalt and each above mentioned modification of each

operation to what showed a mere example of the somatization which hits carrying out this invention, and the technical range of this invention is not restrictively interpreted by these.

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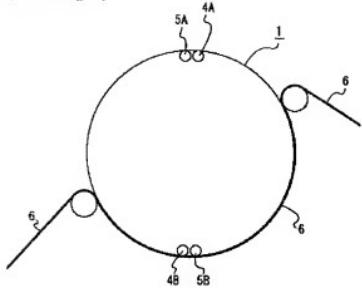
## DESCRIPTION OF DRAWINGS

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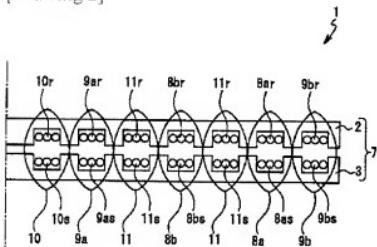
### [Brief Description of the Drawings]

- [Drawing 1] The gestalt of operation of the 1st of this invention is shown with drawing 2 thru/or drawing 4 , and this Fig. is a top view showing a rotor side drum roughly.
- [Drawing 2] It is the outline sectional view of a rotary transformer.
- [Drawing 3] It is an outline circuit diagram.
- [Drawing 4] It is timing-chart drawing showing the operating state of each channel.
- [Drawing 5] It is the outline circuit diagram showing the modification of a rotary transformer.
- [Drawing 6] The gestalt of operation of the 2nd of this invention is shown with drawing 7 thru/or drawing 10 , and this Fig. is a top view showing a rotor side drum roughly.
- [Drawing 7] It is the outline sectional view of a rotary transformer.
- [Drawing 8] It is an outline circuit diagram.
- [Drawing 9] It is timing-chart drawing showing the operating state of each channel.
- [Drawing 10] It is timing-chart drawing showing the modification of a stage of operation.
- [Drawing 11] An example of the conventional rotating drum is shown with drawing 12 thru/or drawing 14 , and this Fig. is a top view showing a rotor side drum roughly.
- [Drawing 12] It is the outline side elevation of a rotating drum.
- [Drawing 13] It is record pattern drawing having shown typically the truck recorded on the magnetic tape.
- [Drawing 14] It is timing-chart drawing showing the operating state of each channel.
- [Drawing 15] An example of another conventional rotating drum is shown with drawing 16 thru/or drawing 18 , and this Fig. is a top view showing a rotor side drum roughly.
- [Drawing 16] It is record pattern drawing having shown typically the truck recorded on the magnetic tape in the mode 1.
- [Drawing 17] It is record pattern drawing having shown typically the truck recorded on the magnetic tape in the mode 2.
- [Drawing 18] It is timing-chart drawing showing the operating state of each channel.
- [Description of Notations]
- 1 -- A rotating drum, 4A -- A recording head (azimuth-angle A), 4B -- Recording head (azimuth-angle B), 5A -- The reproducing head (azimuth-angle A), 5B -- Reproducing head (azimuth-angle B), 7 -- A rotary transformer, 8a -- Recording system channel (azimuth-angle A), 8b -- A recording system channel (azimuth-angle B), 9a -- Reversion system channel (azimuth-angle A), 9b -- A reversion system channel (azimuth-angle B), 10 -- Power system channel, 11 -- A short ring (shielding channel), 21 -- Rotating drum, 24A -- A recording head (azimuth-angle A), 24B - - Recording head (azimuth-angle B), 25A -- The reproducing head (azimuth-angle A), 25B -- Reproducing head (azimuth-angle B), 26 [ -- A reversion system channel (azimuth-angle A), 28 / -- Reversion system channel (azimuth-angle B) ] -- A rotary transformer, 27a -- A recording system channel (azimuth-angle A), 27b -- A recording system channel (azimuth-angle B), 28

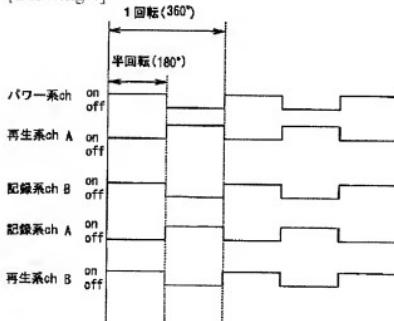
[Drawing 1]



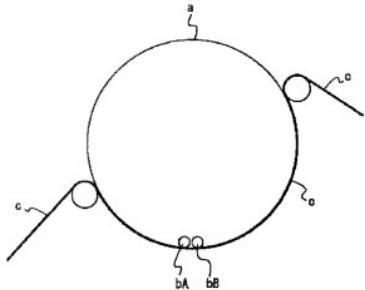
[Drawing 2]



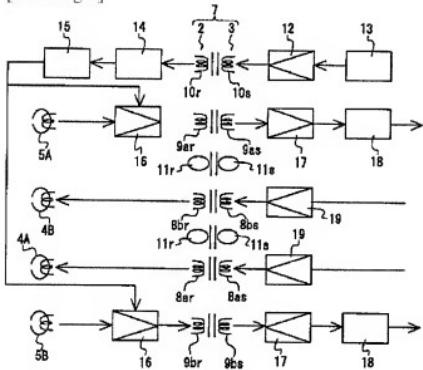
[Drawing 4]



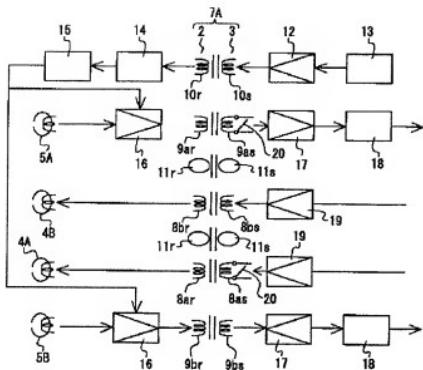
[Drawing 11]



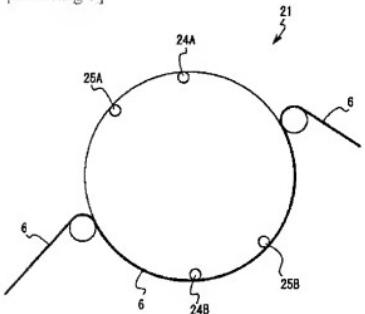
[Drawing 3]



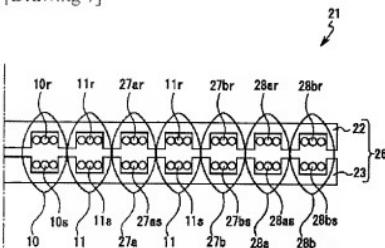
[Drawing 5]



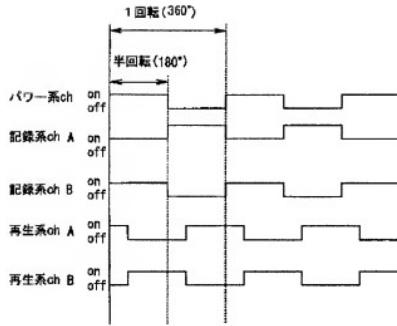
[Drawing 6]



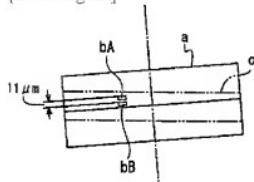
[Drawing 7]



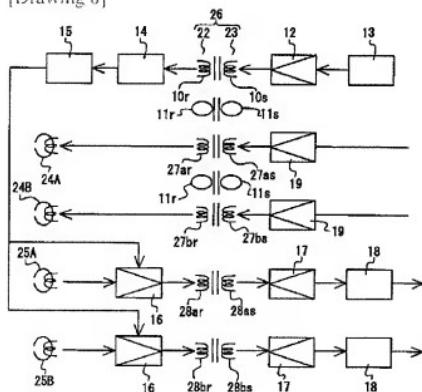
[Drawing 9]



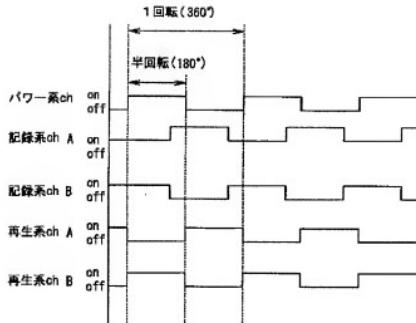
[Drawing 12]



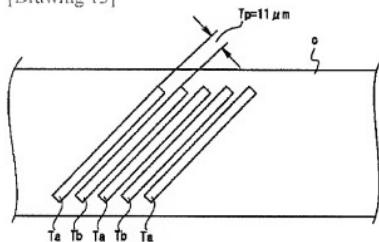
[Drawing 8]



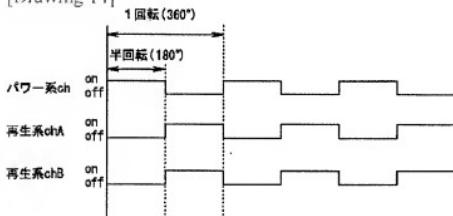
[Drawing 10]



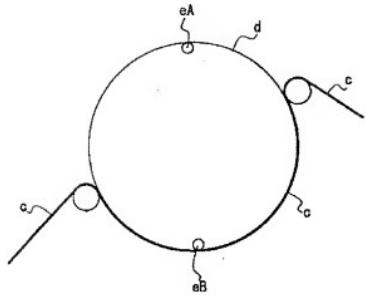
[Drawing 13]



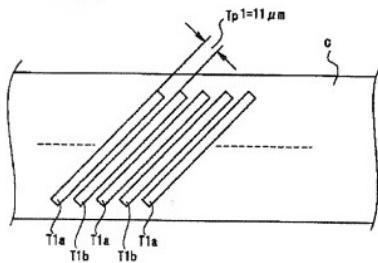
[Drawing 14]



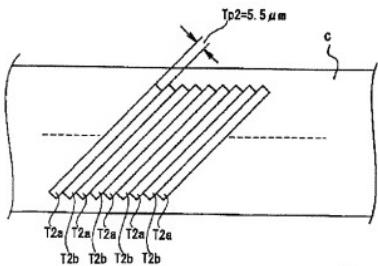
[Drawing 15]



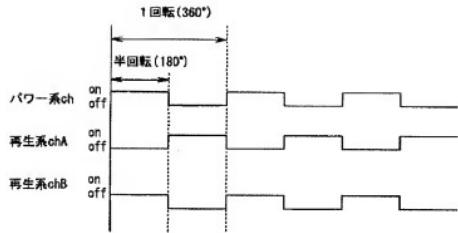
[Drawing 16]  
毛- $F_1$



[Drawing 17]  
毛- $F_2$



[Drawing 18]



\*Translation obtained at <http://www4.ipdl.ncipi.go.jp/Tokujitu/tjsogodbenk.ipdl>. This document has been translated by computer. So the translation may not reflect the original precisely. \*\*\*\* shows the word which can not be translated. In the drawings, any words are not translated. The Japanese Patent Office and National Center for Industrial Property Information and Training are not responsible for any damages caused by the use of this translation.